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CONTENTS

GENERAL ARTICLES

Columbus and Copernicus: New Wine in Old Wineskins *Richard D. Lamm* 1

Lipid Studies in Primary Gout *Ts'ai-fan Yu and Irwin Oreskes* 11

Choices in Surgical Treatment of Rigid Neurogenic and Arthrogrypotic Club Feet *Sheldon Lichtblau* 17

Systemic Lupus Erythematosus of the Central Nervous System: 2. Molecular Theories and Models for Mental Disease *Nathan Moskowitz* 23

Acute Thrombosed External Hemorrhoids *Changyul Oh* 30

Value of Hepatic Blood Flow Study in the Diagnosis of Hepatoma *Hee Kyung Lee, Joseph Skarzynski, and Unsup Kim* 33

Mucosal Proctectomy and Ileoanal Anastomosis *Rhona J. Keller, Barry A. Salky, and Irwin M. Gelernt* 36

Arterial Flow in Venous Volume Studies *E. Converse Peirce II and Harry Schanzer* 41

Quantitative Computerized Joint Scanning in Rheumatoid Arthritis: An Accurate Reproducible Method of Quantitating Synovitis—Preliminary Report *Daniel J. Wallace, Michael Brachman, Gary Feldman, Ronald Reichman, and James R. Klinenberg* 46

Albendazole in the Conservative Management of Multiple Hydatid Disease *B. Golematis, G. Lakiotis, P. Persidou-Golemati, and G. Bonatsos* 53

continued inside

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Summary.
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Indication: Lower respiratory infections, including pneumonia, caused by *Streptococcus pneumoniae, Haemophilus influenzae,* and *Streptococcus pyogenes* (group A β-hemolytic streptococci).
Contraindication: Known allergy to cephalosporins.
Warnings: CECLOR SHOULD BE ADMINISTERED CAUTIOUSLY TO PENICILLIN-SENSITIVE PATIENTS. PENICILLINS AND CEPHALOSPORINS SHOW PARTIAL CROSS-ALLERGENICITY. POSSIBLE REACTIONS INCLUDE ANAPHYLAXIS.

Administer cautiously to allergic patients.

Pseudomembranous colitis has been reported with virtually all broad-spectrum antibiotics. It must be considered in differential diagnosis of antibiotic-associated diarrhea. Colon flora is altered by broad-spectrum antibiotic treatment, possibly resulting in antibiotic-associated colitis.

Precautions:
- Discontinue Ceclor in the event of allergic reactions to it.
- Prolonged use may result in overgrowth of nonsusceptible organisms.
- Positive direct Coombs' tests have been reported during treatment with cephalosporins.
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- Broad-spectrum antibiotics should be prescribed with caution in individuals with a history of gastrointestinal disease, particularly colitis.
- Safety and effectiveness have not been determined in pregnancy, lactation, and infants less than one month old. Ceclor penetrates mother's milk. Exercise caution in prescribing for these patients.

Adverse Reactions: (percentage of patients)

Therapy-related adverse reactions are uncommon. Those reported include:
- Gastrointestinal (mostly diarrhea): 2.5%.
- Symptoms of pseudomembranous colitis may appear either during or after antibiotic treatment.
- Hypersensitivity reactions (including morbilliform eruptions, pruritus, urticaria, and serum-sickness-like reactions that have included erythema multiforme [rarely, Stevens-Johnson syndrome] and toxic epidermal necrolysis or the above skin manifestations accompanied by arthritis/arthralgia, and frequently, fever): 1.5%; usually subside within a few days after cessation of therapy. Serum-sickness-like reactions have been reported more frequently in children than in adults and have usually occurred during or following a second course of therapy with Ceclor. No serious sequelae have been reported. Antihistamines and corticosteroids appear to enhance resolution of the syndrome.
- Cases of anaphylaxis have been reported, half of which have occurred in patients with a history of penicillin allergy.
- As with some penicillins and some other cephalosporins, transient hepatitis and cholestatic jaundice have been reported rarely.
- Rarely, reversible hyperactivity, nervousness, insomnia, confusion, hypertonia, dizziness, and somnolence have been reported.
- Other: eosinophilia, 2%; genital pruritus or vaginitis, less than 1%, and, rarely, thrombocytopenia.

Abnormalities in laboratory results of uncertain etiology
- Slight elevations in hepatic enzymes.
- Transient fluctuations in leukocyte count (especially in infants and children).
- Abnormal urinalysis; elevations in BUN or serum creatinine.
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Volume 56
Number 1
January 1989

CONTENTS *continued*

CASE REPORTS

Cerebellar Tumor Causing Hypertensive Crisis and Simulating Pheochromocytoma and Cushing's Syndrome *Yoram Yagil, Walter Futterweit, Lawrence R. Krakoff, Haya Rubin, and Harry Weinrauch* 56

Sarcoidosis Complicating Primary Sjögren's Syndrome *Federico R. Justiniani* 59

Liposarcoma of the Ileocecal Valve: A Case Report *Dennis L. Wood and Leon Morgenstern* 62

Polyarthritis as the Initial Symptom of Secondary Syphilis: Case Report and Review *Philip G. Kazlow, Barbara Beyer, and Gary Brandeis* 65

Nonsurgical Management of an Isolated Interhemispheric Subdural Hematoma Sequentially Followed by CT *John O. Lusins and James D. McChesney* 68

STUDENT CORNER

Orthotopic Liver Transplantation in Children *Ida B. Mendez and Elaine Leddomado* 71

Letters

Diltiazem-Associated Thrombocytopenia: An Opposing Viewpoint *Michele R. Flicker, Mark A. Quigley, and E. Gerald Caldwell* 77

Correction 77

Index to Advertisers

Eli Lilly and Company **Cover 2**

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The medical and health care professionals must be made more aware of the articulated views on health care issues of well-informed lay members of society. The complete transcript of such statements, with specific facts and conclusions, is often not generally or easily available to those of us who are busily engaged in our professional activities. Such views may have a great impact on both public policy enacted by federal, state, and local governments, and in the private sector. Experts, some medical and health professionals, may be asked to support or rebut such positions as part of the decision-making process in the public and private arenas. It is not enough to be exposed only to a brief and often sensational report of such views. It is in this context that we offer this commentary and invite concise and constructive responses from readers.—Sherman Kupfer, M.D., Associate Editor

Columbus and Copernicus: New Wine in Old Wineskins

RICHARD D. LAMM

Let me start off with a parable: An admiral in the U.S. Navy was on the high seas and all of a sudden a little blip shows up on the radar screen. The admiral tells the ensign, "Tell that ship to change its course 15 degrees." The word came back on the radio, "You change your course 15 degrees." The admiral said, "Tell that ship that we're the U.S. Navy and to change its course 15 degrees." The word came back on the radio, "You change your course 15 degrees." The admiral himself got on the radio and said, "I am an admiral in the U.S. Navy—change your course 15 degrees." The word came back, "You change your course 15 degrees—I am a lighthouse."

I call this a parable because it reflects my views that we are sailing into a whole new and much more volatile world of public policy. Specifically I believe we are heading for shoals. I believe we can navigate around them, I believe we can change course: but unless we do so in some important areas we shall crash into the future.

Let me describe for you the new world of public policy into which I believe we are sailing. There have been four major revolutions in the last twenty years which will permanently change public policy in the United States.

1. We have gone from a continental economy to an international economy. New York used to compete with New Jersey, Pennsylvania, and Illinois. Today it is competing with Japan, Korea, Singapore, and West Germany. We have not fully explored or fully understood the implications of living in an international economy.

2. Public policy makers no longer have a rapidly growing pie to solve all our problems. It was marvelous to be a politician in the 1960s, because U.S. productivity was the highest in the world and U.S. wealth doubled every 20 years. Today the U.S. has the lowest productivity rate in the industrial world and it takes over 100 years to double U.S. wealth. The average U.S. family makes less money (as adjusted for inflation) in 1987 than they did in 1973. Public policy no longer has as expansive a "growth dividend" to solve public policy problems. We no longer have the wherewithal to be indiscriminately generous. We must understand, as one economist once told me, that "capital is the stored flexibility we have to build our children a better future." How we spend that limited capital will dictate what kind of lives we will leave our children.

3. America is aging—fast. Since 1900 the population of the United States has increased three times, the population of those over 65 years old has increased 8 times, and the population of those over 85 years old has increased 21 times. By the year 2050 there will be as many people

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Adapted from a talk at the Mount Sinai School of Medicine, New York City, on Alumni Day, April 16, 1988. Mr. Lamm, a former governor of Colorado, is director of the Center for Public Policy and Contemporary Issues of the University of Denver and also practices law with the Denver firm of O'Connor and Hannan. Address reprint requests to him at O'Connor and Hannan, 1 United Bank Center, Suite 4700, 1700 Lincoln Street, Denver, CO 80203-4547.

over the age of 80 as there are people today over the age of 65. Between 1986 and 2040 the population aged 65 to 74 will grow by about 85%, the population aged 80 and over will grow by about 300% to 400%, and the population aged 90 and over will grow by an astounding 500% to 700%. We must better assess and more candidly discuss the implications of this demographic earthquake.

4. There is a revolution of medical technology. We now have people working on transplants or artificial organs (or both) for all the organs of your body. There has been an explosion of new treatments, techniques, and procedures we can give to people. We can now keep a corpse alive. The miracles of modern medicine are clearly outpacing the public ability to pay for them. Infinite medical needs, especially for the elderly, have run into finite resources.

All of these together create a new world of public policy. America is consuming more than it is producing, and spending far more that we earn. Our politicians spend far more than the income generated by taxes, and we as a society want more than we can afford. In all areas of American activity, but especially in the health care field, infinite demands have run smack into finite resources.

Thus we must adjust ourselves to this new world of public policy. This requires a change in our thinking and our public policy.

I have another parable for that change in thinking. When I was at Dartmouth last winter I heard the story of the professor who always gave his class the same exam. Year after year, the same questions would show up on his examinations. His colleagues, shocked by this seeming breach of professionalism, went to him and said: "You can't always give the same examination!" He looked at them sagaciously and said, "You don't understand, you don't understand: every year I expect different answers."

The public policy kaleidoscope is forever turning, presenting us with a new pattern. We must be sensitive to those changed circumstances. If I could leave anything carved over the capitol in Denver, it would be "Beware of solutions which were appropriate to the past but are disastrous to the future." There is an old hymn out of my youth which goes:

New occasions, teach new duties
Time makes ancient good, uncouth

We must adjust our public policy to meet the new realities we are faced with. We must do this for our children's sake. Dietrich Bonhoeffer said during his fight with Hitler: "The ultimate test for a moral person is how the coming generation will live." I would like to use that ethical theme, expand upon it, and give you a list of new public policy considerations I think are important to the new world of public policy into which I see us sailing.

This brings us to Copernicus. Copernicus made his contribution to history by asking the right question. He asked, "Perhaps, instead of the sun going around the earth, does the earth go around the sun?" In that spirit I ask:

1. Instead of society adjusting itself to rising health care costs, doesn't health care have to adjust itself to society's limited resources? Just as man can't live by bread alone, a society can't live by health care alone. But that's exactly where we almost seem to be going in the United States. We have other desperately important functions in which we have to invest to leave the kind of world we want to leave for our children and grandchildren. We must invest in education, infrastructure, and retooling America. Where are we going to get the jobs for our kids? Yet our whole system is tilting toward health care and toward the military.

When I entered high school in 1950, health care was 45.9% of what our society spent on education. This last year it was over 100%. In 1950, we spent $1 billion a month on health care—in 1986, it's well over $1 billion a day. We have many important things to do with our limited societal resources. Health care is one of them, no question. But it isn't the only one. Yet it is the one that we seem to give such precedence to, so much so that it almost dominates all of the others. One of the governors calls health care the "PAC MAN of his budget." If you want to build up a great university, you want to build up your infrastructure; you want to help retool your industries—here comes PAC MAN, coming through your budget, eating up your flexibility. In my opinion we, like the fading southern family in William Faulkner's novel that takes sick and ceases to work, are treating our illness at the expense of our livelihood.

We spend more than a billion dollars a day for health care, but our bridges are falling down, our teachers are underpaid, our industrial plants are rusty. This simply can't continue. There is something fundamentally unsustainable about a society that moves its basic value-producing industries offshore, yet continues to manufacture artificial hearts onshore. We have money to give smokers heart transplants, but no money to retool our steel mills. We train more doctors and lawyers than we need, and fewer teachers. On any given day, 30%–40% of the hospital beds in America are empty, but our schoolrooms are overcrowded, and our transportation systems are deteriorating. We are great at treating sick people, but we are not very great at treating a sick economy. We are not succeeding in international trade. In the last six years we have imported half a trillion more goods from abroad than we have sold abroad. Where are the industries the United States is succeeding in? They are very few and far between.

I believe one of the challenges of America's future is, How do we wisely invest our scarce resources? To do this, we must be realistic, we must ask heretical questions, we must question sacred cows. We can't simply stand back and let one segment of our economy, no matter which one it is, dominate all the others. So when you look at where America is spending its resources, you soon get to health care.

Dr. Phil Caper, who with Dr. Jack Wennberg is doing some very creative thinking in the health care area, puts it this way:

> . . . despite the doubling of resources devoted to medical care over the past two decades, we are hard pressed to point to specific improvements in the health status of Americans sufficient to justify such a massive transfer of wealth from other sectors of the economy.

I couldn't agree more. Like the man who carries a first aid kit, the weight of which gives him blisters—which is why he's carrying the first aid kit in the first place—in my opinion, our health care system has become part solution, part problem. We wouldn't want to be without it, but it has become a heavy burden. It is definitely interfering with the public's ability to invest in our public goods, and with private industry's ability to retool itself. Health care insurance now costs U.S. corporations approximately $125 billion per year, which is 50% of their pretax profits. That's money that is desperately needed elsewhere. The 10% of the price of an American automobile that represents health care (and that is rising 2½ times the rate of inflation) is rapidly making our goods more uncompetitive on the international marketplace.

In short, if we want an efficient and successful society, we must examine closely every institution in America, but especially health care. It's the Willie Sutton theory of bank robbery. When asked why he robbed banks, Willie replied: "That's where the money is." That's true today about health care.

2. Who buys more health for society: doctors, or sewage disposal plant workers, or public health workers? Startling, perhaps? But let me tell you, when you start looking at how you buy health for a society, you do not start with doctors and hospitals. With due respect to doctors and hospitals, which are immensely important, when you look realistically at public policy, there is little correlation between how much money is spent on doctors and hospitals and how healthy the society is.

We are too easily seduced into thinking that health care means doctors and hospitals, when actually the great advances in health care have been made in sanitation, pasteurization, chlorination, antibiotics, and refrigeration. Screened windows to keep out mosquitos were an incredible forward advance of health. Public health officials have saved more lives than hospitals have.

If we look at how we can improve the health of the average American, we find a similar figure. The greatest causes of premature mortality, not of total mortality, are very simple: smoking, drinking too much, eating the wrong things, and not wearing your seat belt. If you really want to know how you get America healthy, you start attacking those things. Those are four things an individual has under their control, and three of them are things we do with our mouth. The mouth is the most dangerous organ in the body. Nutrition, exercise, environment, worksite risks—all of these could bring more cost-effective health to America than many of our current medical procedures.

We should never have allowed doctors and hospitals to become synonymous with "health care." We assume that because it was called "health care" it had to be good. The researchers tell us the factors in avoiding premature death and disease are: life style, 50%; environment, 20%; human biology, 20%; inadequacies in the health care system, only 10%. We have allowed the professions that make the most tangential contributions to appropriate the name. We must be very careful what we call something. I remember in "Rocky" when Sylvester Stallone won the boxing title and with it a great deal of money. People in his entourage were suggesting how he invest the money. "Stocks and bonds" yelled one, "real estate" cried another, "condominiums" cried a third. At which point Rocky looked at the man making the "condominium" suggestion and said "Naw, I never use them. I'm Catholic".

We must avoid a similar confusion. It becomes clear that there are many paths to health, and certainly doctors and hospitals are one of them. I would rather have a dollar a pack tax on cigarettes than I would another $100 billion put into the health care area. Smoking kills the equivalent number of people as a 747 crash every day in America. 360,000 people a year die from cigarettes. So when you look at the kind of alternatives available—you give me some of those empty hospital beds to lock up drunk drivers and I'll save more lives than the hospitals would. A mandatory seat belt law would probably save more lives than all the CAT scans in America.

As I say, America has to look at what we are getting for our money. The United States spends $2,000 per capita on health care, Great Britain spends $500 per capita on health care, Singapore spends $200 per capita on health care, and yet we all have the same mortality and morbidity rates. How can anyone justify this discrepancy? You have asked for cost-conscious politicians. Well, how can the political system allow the recent dramatic increases in health costs, when other nations provide full medical care to all their people and at a fraction of the per-capita cost as we do in the United States, and they still have comparable health statistics? You're going to say that doesn't include cataract operations and hip replacements, and you're right. But I'll tell you again, mortality and morbidity rates are an immensely important yardstick—at least one of the yardsticks—I think it's very important. There is an inverse correlation in our industrialized world between how many doctors you have and how healthy your society is. West Germany has the largest number of doctors per capita; they've got the worst health statistics. Japan has the least number of doctors per capita; they're the healthiest. There are all kinds of ways to health, and society has to look objectively and say how do we get the most bang for our buck?

We are not as healthy as some countries that spend only one-eighth what we spend. Health care is a black hole of public policy into which you can pour infinite assets and often get only marginal returns. We have given health providers the highest social status in our society, we have made medicine the highest paid profession in America, we have made running a hospital one of the most profitable sectors of the economy, we have given that system 11 cents out of every dollar spent in America; and yet if you're an American male you're only 15th in world life expectancy and if you're a female you're 8th in world life expectancy.

I am reminded of Jack Kent Cook, owner of the Washington Redskins. When asked why he fired his football coach George Allen: "I gave him an unlimited budget and he exceeded it." That's how I feel about health care.

3. Don't we inevitably have to ration medicine? We are not wealthy enough to base our health care system on the assumptions that we can give everything our genius has invented to all of the people out there. I believe clearly that the United States must ration medicine. It is clear to me that we already ration medicine. We deny it and, as Linus in Peanuts says, "There's no issue too big you can't run away from it," but clearly we already live in a society that rations medicine.

But the genius of medicine has outpaced America's ability to pay. No society, anywhere in the world, has figured out how not to ration health care. We must be open about the values and stakes involved. The Painful Prescription tells us that. Rudolf Klein, a very thoughtful observer from England, says, "Rationing is inherent under any health care system." A portion of the Oregon Health Decisions says:

> We cannot live under the idea that we can give everybody all the health care that they need. Rationing of health care is inevitable because society can not or will not pay for all of the services modern medicine can provide. People in this state must search their hearts and their pocketbooks and decide what level of health care can be guaranteed to the poor, the unemployed, the elderly and others who depend on publicly funded health services.

They point out that we already ration medicine—chronologically, economically, geographically, politically, scientifically, by disease, etc. Thirty-three million Americans lacked hospital insurance in 1982, and perhaps another 16 million had inadequate coverage.

In short, rationing is not a future possibility —it is a present reality. The Greeks say: "To know all to ask is to know half." I believe that if we start asking the right questions, we vastly improve our chances of coming up with the right answers. If we ask ourselves, how do we avoid rationing, I believe that we do our society an injustice. If we ask, how do we allocate finite resources to meet infinite demand, and do it compassionately and justly, then I believe that we can increase rather than decrease medical care in our most basic areas. Rationing can be described in the same words that Mark Twain said about Wagner's music when he said: "It's not as bad as it sounds."

4. How do we take limited dollars and buy the most health? Humana's budget for the artificial heart is roughly equivalent to what society spent on eradicating smallpox. Consider the difference between those two. The fact is we have a system that seems to give dramatic high technology medicine the health care dollar, when a third of the kids in America have never seen a dentist, and 20% of the kids in America don't have their polio shots. The Robert Wood Johnson Foundation in 1982 found that 12% of all Americans, or one in eight, have serious problems with access to health care and found in that year, one million families had at least one member who was refused health care.

We must thoughtfully weigh the way we spend our health care dollars. We must develop a "sense of limits" in spending health care dollars, an objective sense that we are making an intelligent allocation of limited dollars.

Lester Thurow talks about an exercise for doctors in which every time they order an expensive procedure, they would have to pick an American worker to be sentenced to a period of slavery long enough to pay the medical bill for that procedure. Dr. Tom Starzle at the University of Pittsburgh recently gave a liver transplant to a 76 year old woman. It cost $240,000. Tom Starzle should have had to go out and find 100 American families to give all of their yearly income so that he could understand that we can't do everything for everybody. Celebrity doctors performing dramatic, highly publicized procedures may gain national recognition but they do not add to the total national well being. It may make a doctor or a hospital famous but it is not a cost effective expenditure of public funds. The "opportunity costs" of these resources are obviously much, much higher elsewhere. It may be great public relations, but it is poor health policy. For every person it saves, it condemns two or three more who today die because we are not allocating our dollars where they will buy the most health for America. We are, unfortunately, faced with a series of Hobson's choices. Harvey Cox, the theologian, says, "Not to decide is to decide." So in fact by avoiding these issues, we are deciding. Deciding often in favor of the most inefficient and wasteful ways to spend our dollars. By not challenging our sacred cows, we are creating a tougher and more chaotic world for our children.

5. Is it an economic asset to have two-thirds of the world's lawyers and the highest ratio of doctors and hospitals in America? It is not an economic asset for America to have two-thirds of all the lawyers practicing in America; it is an economic cancer. Forty percent of the Rhodes scholars in this country go to law school. Japan trains 1,000 engineers for every 100 lawyers. We train 1,000 lawyers for every 100 engineers. Now which society in a technologically-based, information-based society is going to win? The one that trains lawyers? The same thing applies in the physician field. It is estimated that there may be as many as 145,000 more physicians than needed by the year 2000. Duke points out that every excess doctor, or every doctor in practice, increases the nation's health care costs by $300,000 annually. Thus, in an average career spanning 40 years, a single physician would create health care costs of some $12 million. You've got to limit the number of people going into those two fields.

We have one of the highest physician-to-population ratios in the world and yet we still add 15,000 new doctors each year.

Hospital bankruptcies in a lot of areas of America ought to be put under the "good news today" column of the newspapers. But there are 200,000 excess hospital beds in the United States. That's equivalent to at least, let's say, 1,000 hospitals out there that we don't need, that we've overbuilt. Then, a recent study found that 25% of all hospital days are inappropriate because the services rendered do not require hospitalization—services like oral medication. A hospital should be an institution of last resort.

The *Journal of the American Medical Association* stated it this way: The hospital of the future will be transformed into the critical care hub of a dispersed network of smaller clinical facilities, physicians' offices and remote care sites that may stretch out as far as 200 miles from the core facility connected by air and ground critical care transport and integrated by clinical information and patient monitoring systems.

I really believe there's no way we are going to come to grips with this problem until we also look at some of these areas that aren't going to go away. One of the toughest of those is what Victor Fuchs calls "flat-of-the-curve medicine"—those medical procedures that are the highest cost and achieve little or no improvement in health status. He says they must be reduced or eliminated. We must demand of professional societies and licensing authorities that they establish some norms and standards for diagnostic and therapeutic practice that encompass both costs and medicine. We're going to have to come up with some sort of concept of cost-effective medicine.

It seems to me the empirical evidence is overwhelming that there are massive inefficiencies in our health care system.

- Medical expenditures for the elderly in Miami, FL, are twice as high as for the elderly in Rochester, NY.
- There is strong evidence that one-third or more of coronary bypass operations are medically unnecessary.
- Hospital use is 60% higher in the Midwest than in the West.
- CAT scans are utilized seven times more often in certain parts of the country than in others.
- In Detroit in 1981, 10% of women delivered by caesarean section; in Washington, D.C., in the same year it was 24%.
- Rate of knee replacements among the elderly, when age adjusted, vary sixfold in different parts of the country.

Some experts postulate that anywhere from 30% to 50% of the nation's health bill consists of expenditures that produce little or no demonstrable health benefit. In a country that is losing the economic race to the Pacific Rim, that is both a tragedy and a disgrace.

6. Is death the enemy of the health care system, or is pain, suffering, degradation? In the words of William Shakespeare, do we not all "owe God a death"? There are certain new realities which we have not fully incorporated into either our public policy response or our thinking.

First is the explosion of the elderly. We all intellectually know the numbers but we haven't begun to absorb this new public policy reality. The total U.S. population tripled between 1900 and 1980—but the aged population grew eight times. The population over 85 grew 21 times. This is not change, it is a demographic revolution.

Second, approximately two million people die each year in the United States, and with today's medical miracles, rapid fatal death is shrinking as a cause of death. Heart disease takes 34% of us, malignancies take 22%, whereas sudden deaths (accidents, homicides, suicides) take only 13%. Thus, chronic conditions cause 87% of all deaths. Treating these chronic diseases causes the overwhelming majority of health care costs in the United States. In my opinion this treatment is taking massive amounts of resources desperately needed elsewhere, and they should be spent on the living, not on the dead.

Third is the reality of our technologies. We can now keep a corpse alive. The new standard of care includes a whole range of Faustian technologies: resuscitation, intravenous feeding, stimulants, oxygen tanks, respirators, heart pumps, drainage tubes, etc. These technologies have made us scientific giants but, alas, we are still moral pygmies. We are technically smart enough to obscure the line between life and death, but not morally intelligent enough to draw the line. We have a hard time even deciding "What is death?" and "When does it occur?" It is a daily practice in hospitals to bring terminally ill patients back to life—just so they can die a second time—at great cost to the taxpayer.

One woman wrote to me of her mother:

"She has no awareness, no personality, no memory, no reason . . . The human being is dead. All that is left is a food-digesting organism. But to the law, she's still living . . . Nursing home care did not afford the dignity to which I felt she was entitled—so here I am, essentially with a corpse I cannot bury, who would have gone timely and been fondly remembered by her family had not the marvels of medicine intervened.

"Now we live with a daily horror situation that has gone on so long that it will be difficult to remember mother as a once talented, brilliant and vital family member."

Tragically, many people who experience death in a family come out of the experience thinking medical treatment is the enemy.

We must look much more maturely at these sensitive issues. Victor Fuchs says that one of our assumptions is, "We should spend any amount of money if a life is at stake." I'm intrigued because I governed a state that has lots of plane crashes. We've got high mountains. There were 101 plane crashes in Colorado last year. Was I supposed to close the schools and close the penitentiaries and send people out looking because a life might be at stake? It sounds so good, but in fact when you're faced with that situation what you have to do is the best you can. You must balance the tragedy to be averted with the resources available.

Consequently, I think it is desperately important to discuss much more candidly and openly death and dying. We treat death as if it were optional. People talk about the right to die, as if we have the right to refuse to die. Once we stop treating death as an enemy and recognizing an inevitability, we can save massive resources. Today patients with massive strokes are saved from death but live for years in a comatose state. Others with metastatic cancer are subject to a myriad of studies and therapies that add little to their longevity. I would suggest that while longevity is a virtue, prolongevity is a sin. I think we must look rationally at the phenomenal amount of resources we spend on the last few weeks of people's lives to only prolong suffering. We cannot afford a system in which on our way out the door, we take $100,000 to $200,000 of our children's limited resources to give us a couple of extra days of pain-wracked existence. Such a practice is more than bad policy, it is intergenerational larceny. It is wasting resources our children desperately need elsewhere to compensate for the kind of world we leave for them.

If you can make people better, terrific. But in American medicine, it often seems to be against the law to die in peace. Most elderly don't fear death as much as they do the pain and suffering and degradation and loss of autonomy that our Faustian technologies have brought to them. Alas, truth be told all our biological clocks must strike midnight. We must learn again what the early churchmen called "the grace of dying well."

7. Why should we give taxpayer money to people merely for reaching the age of 65? Is it good public policy to have the highest life expectancy at age 80 in the whole world, while we are 20th in infant mortality? This is another sensitive subject, and that's the way this whole system is slanted toward our benefit. When my wife and I bought our first house, our house payments were $49 PITI. A recent Congressional study said less than 50% of the kids under 30 are going to be able to buy their own homes. One of the great issues of the future, I believe, is going to be intergenerational equity. Our kids will wake up and find out how badly we've cheated them.

I argue that America doesn't need any more age-based programs. Our programs should be based on need rather than age. Which leads me into the thought of Medicare, the ultimate sacred cow. But when Medicare was passed in 1965, the elderly were disproportionately poor. There was every good reason in Congress to vote for Medicare then. But the elderly are no longer disproportionately poor. In 1970, 23% of the elderly were poor and 12% of the kids were poor. Today, 12% of the elderly are poor and 23% of the kids are poor. You no longer have those same reasons. And yet we give 254,000 millionaires Medicare and we are closing well-baby clinics. We have socialized the cost of health care and given it to all the elderly while ignoring needy kids.

But income adjusting Medicare will not be enough. There must be even tougher choices, and one of those I suggest is that we must make age a consideration in choices on the delivery of health care.

I don't question the need to give both the young and the elderly access to preventive and primary care, but when it comes to limited resources that can't be made available to everyone, I approach the problem in a very personal way. I have a 17-year-old daughter. If there is a limited resource, and you have to decide between my 17-year-old daughter and me, give it to my daughter. Not because I'm being a hero, but because my daughter has 60.4 projected years ahead of her, and I have 28.1 statistical years ahead of me. Such a policy is not age discrimination, it's common sense—who should get any limited resources?

The delivery of expansive medical miracles to the explosive growing number of elderly is creating an unsustainable economic and social burden. We are allocating our governmental benefits to those who lobby us the hardest and comprise the biggest voting block, but we are not making rational allocations. Our present policies, in face of those realities, will prevent adequate health care for other generations, especially younger generations. It is already having a distorting effect and is bound to have an increasing distorting effect.

Dan Callahan writes of a similar impact in Great Britain: "It is understood that the consequences of a desperate struggle to save the lives of the elderly cannot fail to have a distorting consequence for health care priorities and allocations generally."

The longer I was in government, the more I realized that we are moving into an era where we shall have to make hard choices. That there is a public policy teeter-totter: given limited resources, when we push one side up, alas, another side goes down. It is sad but true that we now have a system that allows the elderly to consume far more medical resources than we give to children.

I believe that we shall inevitably have to recognize age as a valid ethical consideration in the delivery of medical care. Is it not only fair, but desirable, to have a different level of care for a 10-year-old than for someone who is 100? Should not public policy recognize that some people have far more statistical years ahead of them than others?

The aged are not a static group. It is a status that we all pass through. We are all locked in as males or females, all locked in as black and white. Once a white male, always a white male. But we all age daily. In a marvelously egalitarian way, time takes its toll on all of us. The elderly are the same people—at a different stage of their lives—whom we worry about when we deny prenatal care to pregnant women.

I turn 65 in the fast approaching year of 2000. I am not shooting a bullet in an intergenerational war, I'm not trying to take something from another generation, I realize that I'm arguing for new rules that I know I will have to live and die by. In fact, given the normal progression of public debate, mine might well be the first generation who they will apply to. I have a great self-interest at the age of 51 to ensure that the new considerations I argue for not be oppressive or hard-hearted. I will be their beneficiary or their victim.

I care a great deal about myself, but I care also for my children. To repeat Bonhoeffer's observation: The ultimate question for a responsible person is, How will the coming generation live? Economists tell us that "capital is stored flexibility" that we have to build better lives for our children. I feel it is morally repugnant if I use $100,000 or $200,000 of our kids' limited resources as I'm on my way out the door unless it gives me substantially more of a quality life. I want to be valued as a senior citizen but I don't want to unnecessarily impose on my children and spend massive resources for a few more months of pain-racked existence.

All cultures distinguish between death after a normal lifespan and a death which is premature. Death due to age is universally accepted and understood. Death before the end of a normal lifespan is universally distinguished and is usually invested with elements of tragedy, as it is in our society.

We shrug and call pneumonia an "old man's friend" and yet rage with Lear at the death of the young. We understand with an atavistic wisdom that we cannot live forever and that death in old age is natural and inevitable. At some point, to fight against death is not only useless, but unseemly.

I find it morally offensive even at the age of 51 to demand the same level of medical treatment as someone who has their whole life ahead of them.

Yet there is reason to pause. The ghost of the English system hovers over this debate, a system that seems cruel to our eyes because it rations certain scarce resources on the basis of age. I do not argue for such a system.

We have other ethical options between massive oppressive technology imposing a slow painful death on us, and arbitrary rationing using age as the criteria. I do not argue that age should be the only criteria, but that it should be one of the criteria.

I find it hard to believe that the health care system should consider a person's blood pressure, whether or not they smoke, how much alcohol they drink, what their cholesterol count is, but not consider their age. I believe age should not be the consideration, but one consideration along with many others in the allocation of medical resources. It should not dictate, but it should be considered. That doesn't give anyone a license to abandon me, or treat me as superfluous. Far from it. But I should not and will not object if age is laid on the scale in deciding medical treatment.

I consider it relevant in how I treat me—why shouldn't the health care system? I no longer climb trees or play rugby. I don't lower myself in my own self esteem that I realize I have an older body. I treat it with more care. I recognize that my time is limited. I spend more time smelling the flowers.

If I consider it relevant, why shouldn't my doctor?

Dan Callahan makes a similar point:

"The elderly have already lived out a full life. They have not been denied (at least because of their age) the opportunities of living a life; and their death deprives them of less than a child or young person who has had no such opportunity. Not only does it seem justifiable to work harder, and to take more chances, to save and rehabilitate the life of a sick child, but also to allocate more resources to those conditions that bring premature death than to those that bring death after a long life."

In rationing scarce resources, age is an ethical and valid consideration.

8. Has not our health care system taken on a Stalinist view of public policy? We have in this country a media-driven humanitarianism. Whoever we can get on TV we try to save; we forget the rest. We treat individuals we can see, but we forget the statistics (who are no less individuals) we can't see.

I believe we must weigh the marvels of our health care technologies with other less visible but more cost-effective strategies. You see the Barney Clarks of the world, you see the Baby Fayes; everybody is pulling for them; it's marvelous technology. But we don't see the third of women in America who don't get prenatal care in their first trimester. Stalin said, in a horrible way, but he was right, "One man's death—that's a tragedy. A million men's death—that's a statistic." It really is true. We look at the individuals and we don't look at the statistics. The money we spent on the heart transplant for Mr. Schroeder could have been far more productively spent on the replacement of heart valves for 200 patients or 40%–50% of the poor, pregnant American women who receive no prenatal care in their first trimester. The quality of our mercy should rain on both identified and unidentified lives. We need nonemotional but compassionate yardsticks to measure how we spend limited resources, and we must be concerned with the total population—not merely those we see on TV.

9. Are we not worshiping graven images of high technology? In fact, in the area of artificial organs I would announce right now that until other needs are met, no taxpayer's money will be spent on artificial organs. Are we going to wait until a politically active group of chronic heart patients—many of them smokers—wheel a bunch of artificial heart recipients before a congressional committee, their hearts literally and figuratively in their hands, and plea for the taxpayers to save their lives by providing publicly-paid-for artificial hearts? Is that how we want to set our health care priorities.

I am not a medical Luddite. I admire the miracles of medicine. But I contrast cornea transplants, cataract operations, and hip replacements, which add tremendously to the quality of life for many elderly, to artificial hearts. That doesn't mean we shouldn't experiment with artificial hearts; we shouldn't eliminate any place where medical science wants to go. Medical science has made its greatest discoveries from the unexpected. But it is only when all of a sudden the taxpayers say, "Ok, we're going to start to pay for this." In California they did something like this last year, they decided they were going to pay for transplants and then they knocked 200,000 low income people off Medicare. That's not a good trade.

I believe if we zero-base budgeted the money we now spend in many areas, it clearly would not meet the test of effective medicine. If we zero-base budgeted the $2 billion we spend on end-stage renal disease, the $3 billion we spend on coronary artery bypasses, the $5 billion we spend on intensive care units, the $500 million a year it costs us for CAT scans, we would probably dramatically reduce the amount of money we spend in all these areas and transfer that money to other, more cost-effective areas.

The National Institute of Health called for greatly expanded federal research efforts to develop a fully implantable permanent artificial heart. Such devices, it said, "could provide a significant increase in lifespan, with an acceptable quality of life, for 17,000 to 35,000 patients below the age of 70 annually." The group estimated its annual cost at up to $5 billion!

This is a staggering price to pay for the few people who would benefit. It will add significantly to the costs of health insurance premiums for all of us. It will eat into the budgets for Medicaid and Medicare. But it won't do a thing to prevent heart disease in the first place.

And if we think we can add availability of the artificial heart to other programs and still pay for them all, we are tragically mistaken.

My criticism is not of high technology. There are certain high technologies that deserve to be worshipped, certainly deserve to be respected. A kidney stone crusher can eliminate the need for 80,000 surgical procedures. My criticism is the mindless way in which we invent certain high technologies and then are forced to use them, at the same time foregoing many more high-benefit procedures and technologies that could save so many more lives.

An artificial heart is a high technology, low-benefit invention because its cost is very high and it only benefits a few people.

The ultimate goal to which this society should apply its high technology is the understanding of the mechanisms that are the underlying causes of disease.

Lewis Thomas writes that the diseases that were the greatest menace to human health when he was a medical student on the wards of Boston City Hospital 50 years ago were, "in the order of degree of fear they caused in the public mind, tertiary syphilis of the brain, pulmonary tuberculosis, and acute rheumatic fever. Also, of course, poliomyelitis." He points out that because of classical clinical research, "All four have nearly vanished as public health problems, and the vanishing involved the expenditure of pennies compared to what we'd be spending if they were still with us."

Now that is true high technology medicine.

But just as we would never have cured polio by putting all our money in artificial lungs, so also we will not understand and cure heart disease if we put our money into artificial hearts. In a world of limited resources such choices become clear.

Shouldn't we all be raising some of the heretical questions? I am not going to give you any more heretical questions but there are obviously many others. We should all think of some. Perhaps the question of fee-for-service medicine? Too many doctors believe fee-for-service medicine is a theology. It is not. We obviously can and are organizing medical care delivery through a wide variety of imaginative alternatives. HMO, PPO, and alternative delivery systems of all kinds must be encouraged if we are not to bankrupt America. The "good old days" of cost reimbursement and fee-for-service medicine are not coming back. To wait for these "good old days" to come back is a triumph of hope over reason roughly equivalent to leaving the landing lights on for Amelia Earhart.

Another notable absence on the tablets was any absolute stricture against two levels of health care. I believe the principal task of the health care system today is to provide health care to those who do not have access to it. But I believe it is counterproductive to paralyze ourselves over this issue when we already have a number of levels of health care in the United States. Does anyone think that those with resources don't get a better level of care than those on welfare? I believe it is important to get basic health care to those not covered, and not back away from that worthy goal if it contains an element (as it inevitably will) of two levels of health care.

Summary. To conclude: I am reminded of a story that came out of the Second World War when there was rationing of all kinds, when a man went into a restaurant and ordered a cup of coffee and then asked for more sugar. The waitress cast a cynical eye on him and said, "Stir what you have." I believe that is what America must do with its medical care expenses. We must stir between the over $1 billion a day that we already put into health care. There is not enough money, and we can buy an incredible amount of health if we in fact simply utilize our resources better.

Believe me—I understand I'm not even touching all of them. The great genius of democracy is that once you start asking the right questions, we can all get together to come up with the answers.

We can start off recognizing that our "health care system" has not too much to do with health, has little to do with caring, and clearly is not a system. That recognition of reality would be a giant step forward.

Then we must move simultaneously in many directions to reform our health care delivery mechanisms. We really do have to develop a concept of "appropriate" care or some sort of "cost-effective medicine."

We can teach and encourage patients to be efficient consumers.

We can clearly stop training so many doctors and lawyers. We can, via tort reform, give some protection to the physicians for the incredible cost of malpractice insurance.

We can close hospitals, some hospital beds, ICU units. We can regionalize some high technology medicine.

We can recognize that our medical destiny lies mainly in our own hands. We can encourage health education, health promotion. We can move more from health care to self-care. We can tax cigarettes and alcohol, form hospices, promote immunization.

We can push for alternative delivery systems. We can license paraprofessionals. We can develop DRGs for physician services for inpatient hospital care; we can more fully develop pre-admission screening, second opinion programs, and concurrent review of hospital care.

We can, in short, develop an ethic of restraint—not an ethic of "do more." Then, after we have done all those seemingly impossible things, we are going to have to discuss how we can fairly and compassionately "ration" medicine.

In summary, the issue is, What kind of world are we going to leave our kids and grandkids?

Health care is a very high social and public policy priority, but it isn't the only priority—it can't be a monopoly. We can, working together, find ways to deliver more health care to more people at an even lower cost.

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Lipid Studies in Primary Gout

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Abstract

Serum total cholesterol, HDL cholesterol, LDL cholesterol, and triglyceride were measured in three groups of male patients with primary gout. The groups were defined by the presence of 0, 1, or more than 1 coexisting medical conditions or cardiac risk factors (coronary heart disease, hypertension, diabetes, proteinuria, overweight). Mean values of total, LDL, and HDL cholesterol were lower in patients with one or more associated conditions than in those with none. By contrast, triglyceride levels were significantly higher and exceeded the desirable range. Distributions of individual values of all lipid parameters except triglycerides were similar along the three groups. Triglyceride values, however, were significantly higher in patients with multiple complications. Observed differences in lipid values could not be correlated with patient age or type or nature of medication received.

High triglycerides and LDL cholesterol are not a feature of uncomplicated gout in men. HDL cholesterol tends to be normal and triglyceride mildly elevated. Only in patients with two or three associated medical conditions are high triglycerides or low HDL cholesterol common. Our results suggest that these findings are independently related to concurrent disease and that gout is not necessarily in itself a risk factor for cardiovascular or diabetic disease.

Gout, a metabolic disorder involving abnormal purine metabolism, is invariably earmarked by hyperuricemia. Although hyperuricemia may start soon after puberty, episodic attacks of podagra are more often seen after age 40. Hypertension, coronary heart disease, and diabetes mellitus are frequently found in individuals with gout. Similarly, cardiovascular risk factors such as obesity and hyperlipidemia commonly coexist with gout.

These observations raise the question, Does gout predispose patients to these medical conditions, or are these associations fortuitous? To answer this question, measurements of lipid parameters known to be coronary markers—total cholesterol, HDL cholesterol, LDL cholesterol, and triglyceride—were undertaken.

Materials and Methods

The study population consisted of 120 male patients with primary gout, regularly followed up for varying periods of time (2–20 yr) at the Gout Research Clinic of the Mount Sinai Medical Center (Table 1). When first seen, all had unequivocal hyperuricemia (range 7.0–14.2 mg/dL, mean 9.5 ± 1.1 mg/dL). At the time of study in 1984, serum urate was in general decreased, owing to more careful diet and antigout medications (range 4.2–11.5 mg/dL, mean 7.3 ± 1.8 mg/dL). All patients gave a history of recurrent acute gouty arthritis of varying severity. Twenty-three patients had attacks of renal colic once or more, and 39 had tophi, mostly of minimal degree.

Patients were divided into three groups by number of associated medical conditions or cardiovascular risk factors—coronary heart disease, hypertension, diabetes mellitus, overweight, and proteinuria. Coronary heart disease (CHD) was defined as abnormal ECG and/or pectoris angina; hypertension, as blood pressure of 160/90 mmHg or greater under basal conditions without medi-

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TABLE 1
Clinical Profile of 120 Male Gout Patients

	Group 0	Group 1	Group 2
No. of patients	42	41	37
No. of associated conditions	0	1	2 or 3
Age at study	61.8	62.2	66.4
(mean ± SD, yr)	± 14.4	± 12.6	± 9.0
26–39	7%	4%	0%
40–59	36%	39%	31%
60–85	57%	57%	69%
Age at onset	43.6	44.6	44.2
(mean ± SD, yr)	± 14.2	± 13.6	± 11.8
26–39	40%	35%	35%
40–59	48%	51%	51%
60–85	12%	14%	14%
Duration of gout	17.8	18.0	22.1
(mean ± SD, yr)	± 13.5	± 10.9	± 14.0
1–10	33%	24%	30%
11–20	33%	30%	16%
21–30	12%	35%	27%
31–49	22%	11%	27%
Serum urate at first	9.3	9.6	9.7
visit (mean ± SD, mg/dL)	± 1.2	± 1.2	± 0.9
<7.0	0%	0%	0%
7.0–8.9	39%	32%	30%
9.0–9.9	25%	32%	27%
10.0–14.2	36%	35%	43%
Serum urate at time of	7.3	7.3	7.4
study (mean ± SD, md/dL)	± 1.1	± 1.4	± 1.4
<7.0	48%	49%	38%
7.0–8.9	45%	39%	54%
9.0–9.9	2%	5%	3%
10.0–11.6	5%	7%	5%
Acute gouty arthritis (severe & frequent)	39%	52%	70%
Tophaceous deposits	17%	32%	52%
Renal calculi	14%	24%	19%

cation. All patients had maturity-onset diabetes requiring no insulin. Their hyperglycemia was mild and their glycosuria minimal or negative. Proteinuria, if present, was trace or <1 g/day; none of the patients had azotemia, serum creatinine <2.0 mg/dL, or BUN <30 mg/dL. Asymptomatic proteinuria was mostly related to hypertension, nephrosclerosis, enlarged prostate, diabetic nephropathy, or nephrolithiasis. Many reported a history of cigarette smoking, but none admitted smoking in recent years. All were on more or less low-purine diets. Alcohol consumption did not exceed one drink a day. Metropolitan Life Insurance tables were used as body-weight reference standards (1).

At time of study, all patients were asymptomatic. Antigout or cardiovascular drugs were not discontinued. Forty-two patients had uncomplicated gout with no associated medical conditions (Group 0). Forty-one had one associated condition (Group 1). Thirty-seven had two or more associated conditions (Group 2).

The mean age at onset was similar among the three groups, but duration of gout was longer for Group 2; hence age at time of study was younger for Groups 0 and 1. More patients with serum urate levels of 10 mg/dL or higher at first visit were found in Group 2. At the time of study, virtually all patients exhibited reduced urate levels, and many were normouricemic. Reduction in serum urate to normal was least for Group 2. Severe and frequent attacks of acute gouty arthritis and degree of tophaceous deposits were increased stepwise for Groups 1 and 2 compared to Group 0. The incidence of renal calculi, mostly uric acid (or urate), was not significantly different. None of the subjects, including two with proteinuria, had clinical or laboratory evidence of renal insufficiency.

All blood samples for analyses of total cholesterol, HDL cholesterol, and triglyceride were taken after an overnight fast of 12–14 hr. Serum was stored in a freezer if not analyzed on the same day. Total cholesterol (TC) measurements were performed with the Sigma manual enzymatic kit method (Sigma Chemical Co., St. Louis, MO). High-density-lipoprotein cholesterol (HDLC) was determined by first precipitating other cholesterol fractions (VLDL, LDL, and IDL) with an Mg-dextran reagent (Sclavo Diagnostic Inc., Wayne, NJ). Serum supernatants containing HDLC were recovered by centrifugation at 3,500 rpm for 20 min and analyzed for cholesterol by the Sigma method. Triglyceride (TG) was measured using the Dow manual enzymatic kit method (Dow Chemical Co., Indianapolis, IN). Low-density-lipoprotein cholesterol (LDLC) was calculated as TC − (HDL + TG/5) (2). Serum uric acid was determined using the uricase method at 280 μm.

Results

Lipid Measurements of 120 Gout Patients. For the entire group, mean TC was 202.3 ± 36.0 mg/dL, HDLC was 36.2 ± 10.1 mg/dL, and LDLC was 129.9 ± 30.1 mg/dL (Table 2). All these values were within the clinically desirable range (3); but mean TG (185.5 ± 162.7 mg/dL) was somewhat elevated.

Mean TC levels were not significantly dif-

TABLE 2

Lipid Measurements by Complications, 120 Male Gout Patients (Mean ± SD)

Complications (no.)	Age (yr)	TC (mg/dL)	HDLC (mg/dL)	TG (mg/dL)	LDLC (mg/dL)
All groups (120)	63.3 ± 12.4	202.3 ± 36.0	36.2 ± 10.1	185.5 ± 162.7	129.9 ± 32.1
Group 0					
0 complication (42)	61.8 ± 14.5	210.8 ± 39.1	38.3 ± 9.5	165.4 ± 68.1	138.3 ± 33.6
Group 1					
1 complication (41)					
Hypertension (21)	62.2 ± 12.6	201.6 ± 35.2	37.8 ± 10.7	175.4 ± 93.5	126.0 ± 32.0
Coronary HD (7)	67.6 ± 11.9	193.9 ± 33.5	34.7 ± 11.9	190.6 ± 118.9	116.1 ± 36.5
Overweight (13)	53.0 ± 13.4	196.1 ± 35.7	35.5 ± 8.7	144.5 ± 103.6	122.3 ± 30.6
Group 2					
2 complications (31)					
Hypertension, overweight (14)	63.9 ± 9.8	222.3 ± 45.9	33.9 ± 8.3 ($p = 0.05$)*	256.4 ± 112.3 ($p = 0.001$)*	137.1 ± 45.2
Hypertension, coronary HD (6)	75.7 ± 7.0	190.7 ± 33.2	26.0 ± 5.1 ($p = 0.001$)*	220.5 ± 150.3	120.3 ± 16.7
Diabetes + hypertension or overweight (6)	66.3 ± 7.5	198.2 ± 23.0	28.8 ± 8.0 ($p = 0.02$)*	277.5 ± 103.9 ($p = 0.001$)*	114.0 ± 36.1
Coronary HD, overweight or proteinuria (5)	65.2 ± 7.0	195.8 ± 39.4	39.4 ± 18.4	189.6 ± 103.3	116.5 ± 32.5
3 complications (6)					
Hypertension + overweight, diabetes (4)	61.5 ± 7.8	195.0 ± 35.1	33.5 ± 6.5	234.5 ± 145.3 ($p = 0.1 - 0.05$)*	114.5 ± 11.9
Hypertension, overweight, proteinuria (2)	66.5 ± 7.8	175.5 ± 13.4	31.5 ± 3.5	127.0 ± 1.4	118.5 ± 10.6

* Comparison with Group 0.

ferent in patients with any complications compared to those with no complications. Indeed, most groups had mean values within the normal ranges. Surprisingly, the mean TC was higher in Group 0 than in Groups 1 and 2, except in patients with hypertension and overweight (Group 2a). This may reflect increased dietary awareness among patients with multiple diseases or risk factors.

Mean HDLC for the uncomplicated group (Group 0) was 38.3 ± 9.5 mg/dL. In the presence of hypertension (Group 1a), CHD (Group 1b), or overweight (Group 1c), HDLC levels were not much different from Group 0. HDLC levels were lower in patients with two complications. For the hypertensive and overweight subjects (Group 2a), mean HDLC was 33.9 ± 8.3 mg/dL, ($p = 0.05$) in comparison with Group 0. Mean HDLC was significantly decreased to 26.0 ± 5.1 mg/dL ($p = 0.001$) for the hypertensives with CHD (Group 2a), and to 28.8 ± 8.0 mg/dL ($p = 0.02$) for the diabetics with hypertension or overweight (Group 2c). For those with CHD and overweight or proteinuria (2d), HDLC was 39.4 ± 18.4 mg/dL, not different from those without complications. The mean HDLC for the two groups with three associated conditions was 33.5 ± 6.5 mg/dL (Group 3a) and 31.5 ± 3.5 mg/dL (Group 3b), without much difference from Group 0.

Most of the patients, particularly those with low HDLC, tended to have higher serum TG. The 10 diabetics were among those with high TG

(Group 2c and Group 3a) in addition to the group with hypertension and overweight (Group 2a). The mean TG for these three groups were 277.5 ± 103.9 mg/dL, 234.5 ± 145.3 mg/dL, and 256.4 ± 112.3 mg/dL, respectively.

The distribution of TC, HDLC, and LDLC values was quite similar in patients with no complications and in those with one or more complications (Fig.). For TG values the skew was striking in those with one or more complications. Whereas 20.4% of patients in Groups 1 and 2 had TG >350 mg/dL, none of the patients in Group 0 had such a high level; for zero complications the modal value was 150 mg/dL, whereas for one or more complications this value was 200 mg/dL.

There was a tendency for TC to rise in the 40–49-yr age group and to decline at higher ages. For TG, this maximum was in the 50–59-yr-old group. No statistically significant correlations could be made. No age-dependent trend was observed for HDLC or LDLC levels (Table 3).

Lipid Data by Category and Type of Medication. Sixteen patients were not taking any medication. Forty-seven were receiving antigout drug(s), including colchicine, allopurinol, and/or uricosuric drugs (probenecid or sulfinyprazone). Fifty-seven were receiving other drugs in addition to antigout drugs. Among patients receiving other drugs, 28 were also taking diuretics, 12 β-blockers, 10 diuretics and β-blockers, and 7 β-blockers and other cardiac drugs, e.g., digoxin and/or reserpine (Table 4).

In the 16 patients not taking any medications, TC was nearly the same as the other groups. HDLC was somewhat lower for patients taking diuretics, β-blockers and diuretics, or β-blockers and other cardiac drugs. The differences were not statistically significant. TG, on the other hand, was invariably elevated for patients taking diuretics (210.4 ± 107.9), particularly those taking β-blockers and other cardiac drugs (259.4 ± 123.0). However, owing to the wide intragroup variation, data were statistically nonsignificant. There was little difference in the calculated values of LDLC and its ratio to HDLC among patients in the various medication groups.

Discussion

Many epidemiologic studies have demonstrated that hyperlipidemia is directly or independently associated with coronary heart disease or cerebrovascular insufficiency (4–7). Among 2,200 patients who attended the Gout Research Clinic from 1950 to 1984, 460 men have thus far died. The most common cause of death has continued to be coronary heart disease (8). Based on such data, many believe that gout is itself a cardiovascular risk factor. However, coronary heart disease is also the most common cause of death in the general U.S. male population, and an excess incidence of cardiovascular deaths in patients with gout is not established.

Our present data on gouty men with no medical complications indicate no striking difference in total cholesterol or HDL cholesterol compared to the Lipid Research Clinic Population Study (9, 10). Comparison of data from gout patients with one or more associated medical conditions and data from those with no associated conditions showed no significant elevations in mean TC or LDLC. In addition, these values were in the clinically desirable range. Surprisingly, these values tended to be lower in patients with one or more complication. Once they knew they had complications, perhaps they were more conscious of careful dietary regulation.

HDLC was found to be lower, primarily in gouty men with coexistent coronary disease, diabetes mellitus, uncontrolled hypertension, and/or obesity. Low HDLC (<30 mg/dL) occurred in 20% of the gouty men with no complications. HDLC increased to 39% in gouty men with one associated condition and further increased to 52% in those with more than one associated condition. It appears that low HDL cholesterol in gout is related to the presence and very likely the severity of the associated medical condition rather than to the gout.

High-density lipoproteins are considered by many to be a protective factor against coronary heart disease in men. Carcassi et al found no difference in mean HDLC between 32 patients with primary gout and 32 controls comparable in age and weight (11). Mean HDLC for gout patients was 46.7 ± 2.0 mg/dL; in controls the level was 47.7 ± 2.3 mg/dL. Of the 6 who had low HDLC levels, 3 had hypertensive heart disease, 2 had ECG evidence of past myocardial infarction, and 1 had chronic coronary heart disease. These researchers concluded that low levels of HDLC correlate with presence of coronary heart disease. On the other hand, Naito and McKenzie found mean HDLC of 29.0 ± 7.0 mg/dL in 30 patients with gout, in contrast to 48.0 ± 3.0 mg/dL in controls, a reduction of about 40% (12). They did not specify, however, whether their patients had any associated disease.

Hypertriglyceridemia was most commonly found in gout, although elevated cholesterol levels were not consistently obtained by various workers (13–18). The mean TG levels among our

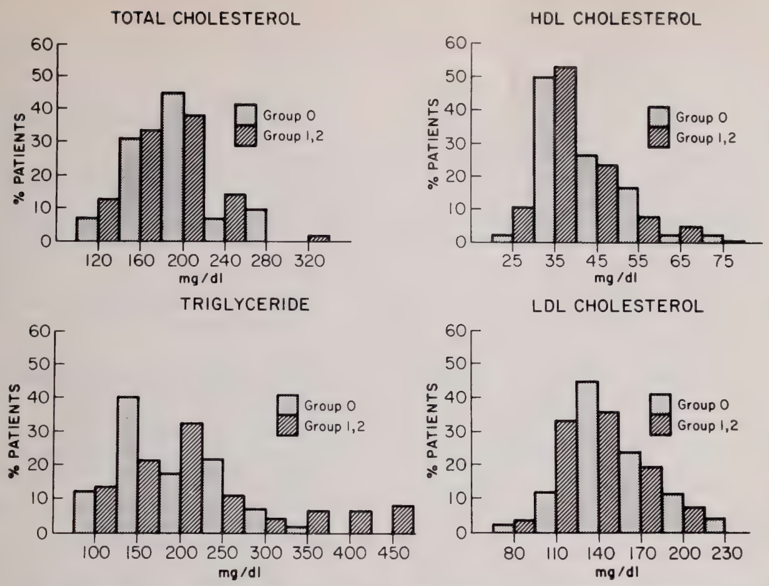

Fig. Distribution of lipid values (total cholesterol, HDL cholesterol, LDL cholesterol, and triglyceride) in gout patients with no associated medical conditions (Group 0) and with one or more associated medical conditions (Groups 1, 2).

subjects were elevated as compared to Lipid Research Clinics (LRC) data (9). This was particularly evident among patients with two medical complications such as hypertension, diabetes, and overweight. This situation is also reflected in decreased HDLC/TG ratios in patients with multiple complications.

Age ranking of the patients in our study (Table 3) revealed no patterns of change or significant difference from those seen for normal men in the LRC data (9). With respect to various modes of medication among the patients we studied, (Table 4), no significant differences were seen in mean lipid levels compared to patients

TABLE 3

Lipid Measurements by Age, 120 Male Gout Patients (Mean ± SD)

Age (yr)	No.	TC (mg/dL)	HDLC (mg/dL)	TG (mg/dL)	LDLC (mg/dL)
26–39	5	193.8 ± 29.0	40.2 ± 11.2	131.2 ± 67.6	129.4 ± 32.0
40–49	9	208.3 ± 40.6	36.9 ± 12.7	179.6 ± 84.8	136.3 ± 33.9
50–59	34	204.3 ± 32.9	35.6 ± 8.3	200.7 ± 102.6	127.1 ± 25.0
60–69	35	203.1 ± 32.6	36.6 ± 11.4	199.6 ± 109.7	132.8 ± 38.4
70–85	37	200.6 ± 35.3	36.8 ± 9.9	184.7 ± 88.5	128.2 ± 32.2

TABLE 4

Lipid Measurements by Medication, 120 Male Gout Patients (Mean ± SD)

Medications	No.	TC (mg/dL)	HDLC (mg/dL)	TG (mg/dL)	LDLC (mg/dL)
None	16	202.6 ± 39.8	36.8 ± 7.8	173.9 ± 104.4	131.7 ± 35.8
AG	47	209.9 ± 39.0	38.7 ± 11.0	181.0 ± 80.0	135.4 ± 33.3
AG, D	28	199.6 ± 30.0	33.0 ± 7.3	210.2 ± 107.9	124.5 ± 25.2
AG, B	12	201.4 ± 37.7	36.0 ± 12.7	172.4 ± 112.9	130.9 ± 26.4
AG, D, B	10	200.5 ± 32.4	33.5 ± 12.9	189.0 ± 64.2	131.1 ± 30.4
AG, B, C	7	197.2 ± 33.2	33.1 ± 4.7	259.4 ± 123.0	112.3 ± 45.7

AG, antigout drugs (colchicine, allopurinol, and/or uricosuric drugs); D, diuretics; B, beta blockers; C, cardiac drugs (digoxin and/or reserpine).

not taking any medication. Some differences that were seen (Table 2) presumably reflect underlying disease.

In the present study there was little fluctuation in TC or HDLC on repeat analysis, over an 8-mo period, in 36 patients whose dietary habits, lifestyles, and clinical conditions remained approximately the same. Triglyceride levels showed somewhat greater variation.

Stability of TC and HDLC levels over time suggests that the lipid methods employed were reliable, in spite of increasingly recognized concerns about reproducibility and accuracy of cholesterol measurement methods (19). A recent study demonstrated (20) that lipid enzymatic methods yielded data 7%–8% higher than the modified Abell-Kendall method used in the Lipid Research Clinics studies (9). Whether this discrepancy applied to the manual mode of analysis is not known, but perhaps the issue is not important since our data have been used only in internal group comparisons. In any case, care was taken in blood drawing to minimize dietary and postural effects.

Of interest was the observation in 1978 (19) of a mean TC value of 235.5 mg/dL for 619 gouty males compared to a mean TC value in the present study of 212.3 mg/dL for 120 gouty males, a drop of some 14.1%. Some of the difference is possibly related to a varying incidence of medical complications. It is, however, likely that at least part of this reduction in mean total cholesterol levels is due to reduced intake of dietary cholesterol, reduced weight, and increased physical activity in the general population.

The data obtained in this study suggest that high TC or high LDLC is not a feature of uncomplicated gout in males. Similarly, HDLC tends to be normal and hypertriglyceridemia to be mild. Only in patients with multiple medical complications is low HDLC or high TC a characteristic feature. This implies (but does not prove) that the latter findings are independently related to concurrent diseases and that gout is not necessarily a risk factor in cardiovascular or diabetic diseases. Among our 42 cases of uncomplicated gout, 8 patients had low levels (<30 mg/dL) of HDLC. Of these, 5 had a family history of coronary heart disease associated with hypertension or diabetes. Hence abnormal lipid values in patients with gout may in some measure be familial and thus independently associated with other diseases.

Acknowledgments

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Choices in Surgical Treatment of Rigid Neurogenic and Arthrogrypotic Clubfeet

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Abstract

Clinical experience in treating clubfoot suggests that the equinovarus deformity in the arthrogrypotic child is often comparable to the equinovarus deformity in certain neurologically impaired children. Both types of feet tend to be rigid, to resist correction, and to present problems of management different from those of idiopathic equinovarus feet. I describe a series of 18 rigid neurogenic or arthrogrypotic clubfeet in 10 children illustrating problems of diagnosis and management and pointing up the desirability of access to a broad range of surgical procedures to solve these unique problems.

Arthrogrypotic clubfeet, and some neurogenic clubfeet, despite their vastly different etiologies, often result in similar end-products: rigidly deformed clubfeet.

The deformities present some unique problems in treatment, frequently different from and often more difficult than the problems encountered in treating idiopathic clubfeet. Among these problems are poorly identified joints, fibrotic muscles, skin and bone breakdown, and superimposed infection. Recourse to a broad spectrum of surgical procedures is useful in solving these problems.

Arthrogrypotic Clubfoot. Arthrogryposis multiplex congenita is a syndrome in which persistent joint contractures are present at birth. The joints are fixed in varying positions of flexion and extension. A typical clinical picture of arthrogryposis might include multiple joint contractures, often symmetrical, with skin that may be glossy. If the contractures are in extension, the skin lacks creases. If the contractures are in flexion, the skin is webbed. The spectrum of arthrogryposis is broad not only in pattern and degree of deformity and rigidity, but also in number of joints involved.

A localized form of this condition may initially produce no clinical findings except rigid clubfeet that are extremely resistant to manipulation. These are difficult to diagnose early as arthrogrypotic. It is only in retrospect, after failure of conservative treatment has led to surgery, during which the lack of joint formation and fibrotic musculature are identified, that the proper diagnosis is considered. (The series described below includes three such patients, each with bilateral deformities.)

Neurogenic Clubfoot. The category of "neurogenic," as used in this discussion, comprises two main entities: spinal dysraphism, represented in the series discussed here by children with myelomeningocele; and cord lipoma.

Not included are clubfeet caused by polio or cerebral palsy. Both of these conditions are neurogenic, but they produce clubfeet that for the most part lack the problems of excessive rigidity.

Although the etiology and central nervous system pathology of myelomeningocele and cord lipoma are vastly different, the local pathology and clinical manifestations in the extremity are often remarkably similar. This is understandable because both conditions produce neural degeneration. In addition, varying degrees and types of deformities in both are produced by the unresisted pull of muscles which lack adequate antagonistic muscles. There are also varying degrees of sensory loss in these patients.

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Clinical Differences. Neurogenic and arthrogrypotic clubfeet are similar in that both conditions pose the same problems of therapy. This is most apparent in the older child. In the newborn, however, clinical differences can be considerable. The arthrogrypotic foot is immediately identified as rigid, whereas the neurogenic clubfoot may start out quite mobile. But repetitive trauma to the insensitive neurogenic foot, possibly repetitive infection as well, plus the lack of motion and excess pressure on the joints necessitated by treatment for the deformity often result in destruction of joint cartilage. This destruction, combined with the severe fibrosis of the ligaments and capsules, produces the deformed and rigid foot seen in the older child.

A Brief Review of Literature on Surgical Choices. Others have recognized some of the difficulties encountered in treating arthrogrypotic clubfoot.

Mead, Lithgow, and Sweeney recommended soft-tissue release and early triple arthrodesis in an effort to produce a plantigrade and painless foot (1). They considered treatment successful if this was achieved even though the foot might be both stiff and very short. Occasionally astragalectomy was used, but this was most often to treat the calcaneus rather than the equinovarus deformity.

Friedlander, Westin, and Wood noted that soft-tissue releases have to be more radical than for conventional clubfeet (2). They gave up simple releases, even as primary procedures. Casts continued to be used as trial, however, because the spectrum of rigidity is broad. When castings and wedgings seemed to be ineffectual, early surgery was recommended. Even with early radical release of the soft tissues, there had been frequent recurrences. Early bone stabilization with triple arthrodesis was often utilized. Surgery always seemed to add some increment of improvement.

Peter Williams recommended tendon transfers in addition to early soft-tissue surgery (3). For the patient with a very resistant condition, astragalectomy was suggested.

Menelaus was the only author who grouped the arthrogrypotics with spina bifida clubfeet and who recommended astragalectomy (4). Because of the rigidity and tendency to recurrence in these feet, he felt that astragalectomy provided the laxity to correct the deformity, removed the tension that caused recurrence, and resulted in a stable foot, because of the postoperative tendency toward rigidity in these clubfeet. The procedure was performed on children over the age of one year, when the feet could not be corrected by other treatment and maintained to an age when arthrodesis would be appropriate.

The disadvantage of astragalectomy is that it is unphysiologic and distorts the normal anatomy.

Indications for astragalectomy, as already mentioned, are deformed rigid feet in young children. Usually multiple disabilities are associated with both the arthrogrypotic and the myelomeningocele deformity, so that obtaining a plantigrade foot is an important first step in improving function.

Case Histories and Discussion

The cases of 10 patients with 18 of these problem clubfeet treated in the Mount Sinai Hospital Children's Foot Clinic are presented here (Table). Four children had arthrogryposis, four had myelomeningocele, and two had cord lipomas. The preponderance of bilateral deformities (8 of 10 patients) is in contrast to the 40% to 50% bilateralism usual in patients with idiopathic clubfoot. In my series, one unilateral clubfoot was in a patient with myelomeningocele, the other in a patient with cord lipoma.

Of the four children with arthrogrypotic clubfeet (patients 7, 8, 9, and 10), only one, patient 7, was so diagnosed on the initial visit. In this child, even though there were obvious contractures in the hands and fingers as well as the feet, the adjacent nonaffected joints were so supple that the diagnosis, though made early, was repeatedly questioned. The other patients in this group were diagnosed as arthrogrypotic only after the feet proved excessively rigid and stubbornly resistant to casting. In one of these children, once arthrogryposis was suspected, mild bilateral knee contractures were identified. In the other two children, the diagnosis was suspected preoperatively and confirmed at surgery by the fibrotic musculature and the absence of joint cartilage.

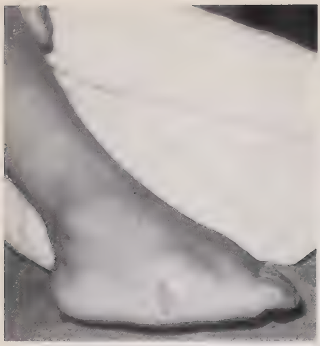
Although the neurogenic feet showed the same features of rigidity and tendency to relapse as the arthrogrypotic feet, these problems in the neurogenic feet seemed to have been mostly avoidable. For example, in this series eight patients with neurogenic clubfeet developed the rigidity gradually and at older ages. Two children had developed ulcerations from the excess localized pressure of walking on inadequately corrected feet. These ulcerations led to frank osteomyelitis, fibrosis, and rigidity. The other three children had simple soft-tissue releases at ages

TABLE

Series of 10 Patients with 18 Rigid Neurogenic or Arthrogrypotic Clubfeet Treated at Mount Sinai Hospital Children's Foot Clinic

Patient	Age	Etiology	Pathology	Previous treatment	Present treatment	Results & follow-up
1	4 yr	Cord lipoma	Bi clubfoot Bi hip & knee dislocation	Bi TAL age 7 mo	Bi astragalectomy	Deformities corrected permitting bracing; left country 6 wk later walking in short leg braces
2	3 mo	Myelomeningocele	Bi clubfeet (rigid)	Casts & braces	Refused surgery	No response to casts; lost to follow-up
3	1½ yr	Sacral lipoma	R clubfoot Ulcer over base of 5th metatarsal	Excision lipoma	Tenotomy abductor hallucis Medial-lateral release	Ulceration healed; deformity corrected; braced; no loss of correction at 22-mo follow-up, age 4
4	14 yr	Myelomeningocele	Bi clubfeet (L rigid, R supple)	Bi medial release Bi TAL Bi plantar fasciotomy, age 1 Resection 5th metatarsal, age 7	Transfer R anterior tibial tendon Dwyer osteotomy R foot	Deformity corrected; able to get foot into shoe; no loss of correction at 17-mo follow-up, age 16
5	5 yr	Myelomeningocele	Bi clubfeet	Casts & braces	Bi medial lateral releases Bi tenotomy, abductor hallucis Bi TAL	Deformity corrected R foot; residual equinovarus L foot. At 2-mo follow-up, R foot remained corrected but L foot unresponsive to cast correction; astragalectomy considered, but patient lost to follow-up
6	3 yr	Myelomeningocele	L clubfoot L subluxed hip	Casts & braces	Tenotomy abductor hallucis TAL, postcapsulotomy	Deformity corrected and easily braced; no loss of correction 2½ yr late at age 5½
7	6½	Arthrogryposis	Bi clubfoot Bi finger contractures	Casts	Bi posterior tibial tendon transfers	Deformities corrected; recurrence of L clubfoot
	9				L anterior tibial transfer	Recurrence corrected, remained corrected 6+ yr later at age 15
8	2½	Arthrogryposis	Bi clubfeet Bi knee contractures	L medial release & TAL (age 11 mo)	Bi medial-lateral releases & TAL	R well-corrected; recurrence varus L after fracture of tibia
	4				L tibial osteotomy	Varus corrected; L leg overgrowth after refracture of tibia No loss of correction 10 yr later at age 14, but major problem of leg length discrepancy from overgrowth
9	12	Arthrogryposis	Bi clubfeet	Casts and bracing	R triple arthrodesis	Deformity corrected, remained corrected 1 yr later at age 13
10	4	Arthrogryposis	Bi clubfeet	Casts Bi TAL age 1	Bi medial release	Residual varus deformities
	4½				Bi tibial osteotomy.	Left foot improved
	5				R medial-lateral release	Inadequate correction
	7½				R triple arthrodesis	Deformity corrected
	10				L triple arthrodesis	Deformity corrected At age 22 both feet stiff but no deformities

Abbreviations: R, right; L, left; Bil, Bilateral; TAL, tendo Achilles lengthening



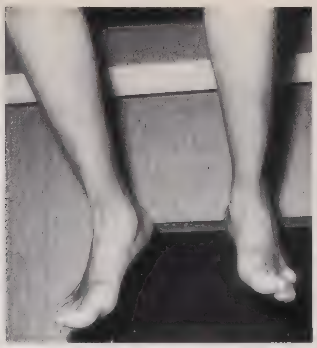


Fig. 1. Left Patient 3. Healed lateral ulceration following tenotomy of abductor hallucis tendon. **Right Fig. 2. Patient 7.** Both feet after transfer of posterior tibial tendons to midline. Note functioning tendons easily seen on dorsum of ankle.

when they were less than 7 months old. Postoperatively, as the deformities recurred, rigidity developed. This pattern of unrelenting recurrence following inadequate correction by soft-tissue releases is mentioned by other authors who have treated these problem feet (5–7).

One child with myelomeningocele was treated with casts at age 3 wk and, despite early treatment, was noted by age 3 mo to have a marked rigid equinovarus deformity in both feet. This was the only case of neurogenic deformity that seems to have been unavoidable.

The striking feature in reviewing the treatments in all of the children in this series is the lack of uniformity of the treatment. The following range of procedures was utilized: tenotomy of the abductor hallucis tendon (8); medial-lateral release (9); tendo calcaneus (Achilles tendon) lengthening with and without posterior capsulotomies; astragalectomy; anterior tibial transfer; Dwyer osteotomy; rotation osteotomy of the tibia; triple arthrodesis; posterior tibial transfer.

A strong attempt was made to individualize each patient's treatment, taking into consideration not only the deformity but also the age of the patient, available muscle function, location of foci of osteomyelitis if present, previous failed surgery, and even social pressures.

Choosing Among Surgical Options: Case Histories. A few case histories illustrate some of the considerations that led to the choice of a surgical option.

Patient 1: Astragalectomy. A 4-year-old girl with cord lipoma, L3–4 level, was brought to the United States from Puerto Rico for a limited time, specifically for her medical problem. She had soft-tissue releases as an infant and because of rigid recurrence of her deformities, was not braceable.

The need for complete and rapid correction to permit immediate bracing, plus the expected lack of long-term follow-up care, made astragalectomy the treatment of choice. Bilateral astragalectomies were performed which permitted good positioning of the feet and immediate bracing. For the first time in her life, ambulation was possible, and she left this country walking in short-leg braces.

Patient 3: Tendon Lengthening, Abductor Tenotomy, and Lateral Release. The initial problem of a 3-year-old boy with cord lipoma was an ulceration at the base of the 5th metatarsal from walking on a deformed anesthetic foot. Because healing of the ulceration was being inhibited by the equinus and varus deformities at the metatarsal level, the first problem was to facilitate that healing by correcting these causative components. Therefore, when the patient was 3 years old, lengthening of the Achilles tendon and abductor tenotomy were performed. These procedures permitted sufficient repositioning of the foot to allow the ulceration to heal (Fig. 1). Eight months later, a medial lateral release was successful in totally correcting the deformity. The lateral incision, near the area of previous ulceration, healed without difficulty.

Minimizing risk of infection is important in anesthetic limbs, which cannot give early warning of infection by pain. Thus, by addressing the initial treatment to the infection and poor skin coverage, a definitive secondary procedure was successful.

Patient 4: Osteotomy and Tendon Transfer. A 14-year-old girl had myelomeningocele and bilateral clubfeet. As an infant she had multiple soft-tissue releases and developed osteomyelitis of the 5th metatarsal on one foot, necessitating resection of the 5th metatarsal at age eleven. That foot, though rigid, was plantigrade. The other foot had a mild varus deformity, increased by weight-bearing, and associated with a strong anterior tibial muscle.

Recognizing the deforming force of the anterior tibial muscle, it seemed important to move the tendon to inhibit its tendency to cause recurrence. At the same time, it was necessary to correct the varus deformity. The Dwyer calcaneal osteotomy was chosen in preference to a triple arthrodesis not only for its ability to maintain desirable subtalar motion, but also for the markedly shorter immobilization period required. The combination of osteotomy and anterior tibial tendon transfer laterally resulted in a well-corrected stable foot which showed no evidence of recurrence on follow-up.

Patient 7: Casts and Tendon Transfers. A boy had arthrogryposis and bilateral clubfeet. Despite the fact that the feet were rigid (unyielding to passive manipulation), they corrected easily with plaster casts. Absence of functioning peroneals was identified early and although transfer of the posterior tibial tendons was considered at age 2½ years, the surgery was not actually performed until the child was 6½ because the wisdom of such a procedure was questioned in view of the ease with which his deformities were corrected. Following transfer, the right foot remained well corrected, but some mild recurrence of varus of the left foot (Fig. 2) required transfer of the insertion of the anterior tibial tendon to the midline of the foot.

Although these tendon transfers were not helpful in idiopathic clubfeet, and have for the most part been abandoned, in the unusual situation presented here of recurrent deformity very much related to under-opposed muscle function, the transfers performed well, much as they do in postparalytic feet.

Patient 8: Lateral Releases, Tendon Lengthening, Posterior Releases, Tibia Osteotomy. A boy had bilateral clubfeet and mild flexion contractures from arthrogryposis. Bilateral medial lateral releases, Achilles tendon lengthening, and posterior releases were performed at age 2½ years. He sustained a fracture of the left tibia, after which recurrence of the varus of the left foot was noted. A rotation osteotomy of the tibia was performed when the boy was 4 years old. Following healing of the osteotomy, the tibia was again fractured on two occasions and developed the usual complication of overgrowth of 3½ cm at age 8½. At this point his dominant problem was the significant discrepancy in leg length.

Patient 5: A Missed Astragalectomy. A child had bilateral clubfeet as a result of myelomeningocele. A section of the abductor hallucis tendon, medial lateral release, and lengthening of the Achilles tendon with posterior release was performed on each foot. The surgery produced a very acceptable correction on the left foot, but failed to completely correct the right foot, which remained unbraceable. The patient was subsequently lost to follow-up before further corrective procedures could be considered.

This case illustrates a mistake in surgical judgment: as astragalectomy should have been performed immediately when it was noted that the soft-tissue procedures were inadequately correcting the deformed right foot.

Conclusions

Experience with these equinovarus feet suggests the following conclusions:

(1) Although most authors recommend early and adequate surgery for arthrogrypotic clubfeet, the concept of "adequacy" is variable. It would seem advisable not to be tied to one or two procedures but rather to think very broadly in treating these feet. As case 4 illustrates, there is a place for tendon transfer surgery because the patterns of muscle weakness and antagonist deformation are not fixed.

(2) Early recognition of an arthrogrypotic club foot requires awareness and an early suspicion of the condition. The diagnosis should be considered whenever the deformity, while not severe in degree, seems to be excessively rigid. Checking the upper as well as the lower extremities on the first examination of a child with a clubfoot will sometimes reveal a finger contracture, a clue to the underlying arthrogryposis.

(3) The rigid clubfoot of neurogenic origin is probably largely preventable by early and adequate treatment.

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Systemic Lupus Erythematosus of the Central Nervous System:

2. Molecular Theories and Models for Mental Disease

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Abstract

A molecular theory attempting to account for the complexity and diversity of the manifestations of systemic lupus erythematosus (SLE) central nervous system (CNS) disease is presented. The clinical manifestations of seizures, pareses, and movement and cranial nerve disorders can be accounted for primarily by immune-complex-mediated small and medium-sized cerebral vasculopathy. The disorders of thought and affect can be explained predominantly by systemic and intrathecal synthesis of antineuronal autoantibodies and brain-enzyme-inhibiting factors leading to alterations in the quantity of mesolimbic neurotransmitter release. It is possible that a multitude of different molecular pathologic derangements can lead to the same or different CNS dysfunctions. The final clinical expression of CNS disease in patients with SLE is dictated by the permutations and combinations of the individuals' underlying genetic predisposition, environmental triggers, specific systemic and intrathecal antineuronal autoantibodies, and the diversity and extent of immune-complex-mediated cerebral vasculopathy. Ways in which SLE-CNS disease may be viewed as a theoretical model for the nature and etiology of mental disease are discussed.

Part 1 of this article discussed the epidemiologic, pathologic, and diagnostic aspects of systemic lupus erythematosus central nervous system (SLE-CNS) disease; this second part discusses proposed molecular mechanisms and etiology. Because the manifestations of the disease are so diverse, in all probability the mechanisms are also varied. Current hypotheses on the etiology of SLE in general and a theoretical construct attempting to account for the variety of clinical expressions of SLE-CNS disease are presented.

Etiology of SLE

SLE is an autoimmune, multisystem disorder that occurs spontaneously in human beings. Vital to the spontaneous development of the disease is the individual's genetic predisposition. The genetic basis of the disease is confirmed by its familial incidence, concordance in identical twins, and HLA association (1). The individual's genetic predisposition leads to excessive B-cell activation. The predisposition to B-cell activation may be due to an intrinsic B-cell defect, a defect in helper cells that abnormally stimulates B cells, or a defect in regulatory T cells that fail to suppress proliferating B cells. It is possible that several of these cellular aberrations operate in the same individual. Ultimately the proliferating B cells are triggered to differentiate into antibody-producing cells. This trigger is responsible

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for initiating either onset or flareup of the disease. This trigger, although endogenous and genetically predetermined, can be modified by many environmental factors, including viral, bacterial, mycotic, or parasitic infections, chemicals, food, and ultraviolet light. These factors may lead to augmented interleukin-1 production thereby inducing augmentation of B-cell activation and differentiation (1).

The B-cell activation itself would not lead to the synthesis of pathologic autoantibodies if genes were not present to allow high responsiveness to autoantigens. For example, in many patients androgens suppress the disease whereas estrogens accelerate it; hence the increased incidence of SLE in females. However, men who have abnormal conversion of androgens to estrogens have a similar increased predisposition to the disease (2). In addition to the genes that predispose to B-cell activation, some genes favor the expression of specific disease attributes. For example, patients with a gene that favors anti-DNA formation may produce abnormally excessive amounts of anti-DNA antibodies that combine with circulating antigens to form immune complexes that bind to the glomerular basement membrane, thereby giving rise to renal disease. Additional antilymphocyte autoantibodies that are synthesized may bind to lymphocytes and lead to further decrease in T-cell function and augmented B-cell activation, thereby exponentially perpetuating the cyclic disease process.

Systemic cellular destruction induced by diverse autoantibodies in the SLE patient leads to inflammation and thus further antigen release, thereby further exacerbating immune complex disease (1). It is conceivable that the predominance of renal or CNS initial manifestations varies from patient to patient, depending on differences in genetic predisposition influencing the production of specific autoantibodies.

Etiology of SLE-CNS Disease

Based on recent pathologic and laboratory studies, it appears unlikely that a single pathologic process can explain the diversity of clinical CNS dysfunction. Because the essential defect of SLE is autoimmunity, malfunction in any organ system, including the CNS, can be attributed to either (a) immune complex deposition leading to tissue destruction or vascular disruption which subsequently leads to ischemic or hemorrhagic zones and thus organ dysfunction, or (b) direct disruption of cellular function by specific autoantibodies. Most manifestations of SLE-CNS disease can be attributed to one or a combination of these mechanisms, ascertained by analysis of pathologic studies (3). The clinical neurologic manifestations that cannot be accounted for by vascular lesions found pathologically or radiologically are in all probability due to the direct actions of neuronal autoantibodies and hence disruption of cell function. These clinical manifestations can now be outlined based on these two different mechanisms.

Clinical Manifestations Attributed Primarily to Vasculopathy. Although generalized seizures may occur secondary to uremia or hypertension as presentations of SLE (3, 4), both focal and generalized seizures have a high correlation with areas of cortical infarction, or intracerebral or subarachnoid hemorrhage secondary to small-vessel pathology (3). Cranial nerve disorders have been highly correlated with lesions in the corticobulbar tracts. Disorders of cranial nerve II have often been correlated with retinal hemorrhages. In addition, blindness and homonymous hemianopsia have been correlated with vascular-occipital events. The most common abnormalities, extraocular eye movements and pupillary abnormalities, as well as the less common defects of diplopia, nystagmus, facial hypoesthesia, and intention tremors have been correlated with areas of infarction or hemorrhage of the brain stem, medial longitudinal fasiculus, or gasserion ganglion (3, 5). Mono- and hemi-pareses have been accurately correlated with thrombotic occlusion of major vessels and subsequent infarcts or hemorrhages (3). In most cases of movement disorders, although no pathologic abnormalities have been found in the basal ganglia or substantia nigra, there have been widespread small areas of infarction in the cerebral cortex, cerebellum, and brain stem which could affect afferent and efferent inputs.

Thus, SLE patients with the common CNS manifestations of seizures, pareses, and cranial nerve and movement disorders have a relatively high pathoanatomic correlation with vasculopathy of small and medium-sized vessels. The fact that the clinical-pathologic correlation is not 100% implies that there may be minute vascular changes that remain undetected, or that autoantibodies may be causally related to these symptoms only in a minority of instances. SLE renal hypertension and uremia can also independently induce the CNS symptoms of seizures, encephalopathy, and delirium.

Clinical Manifestations Attributed Primarily to CNS Autoantibodies. The psychiatric disorders of thought and affect which are not highly correlated with vascular abnormalities must be explained by an alternative mechanism. Although diffuse lesions related to small vessels are often seen in patients with these manifestations, they are always in different locations and defy pathoanatomic classification. Furthermore, patients without CNS disorders on autopsy have similar lesions (3–5). I hypothesize that mechanisms to explain these dysfunctions involve autoantibodies directed against neurons and neuronal brain enzymes involved in neurotransmitter release. To draw this conclusion, the following two criteria must be met: (a) specific antineuronal antibodies must be synthesized and have access to the CNS, and (b) the causal relationship between antineuronal autoantibodies and the evolution of clinical symptomatology must be explained in light of the seeming paradox that antineuronal antibodies are present in patients both with and without CNS disease. These criteria are met in the following ways.

Antineuronal Antibodies in SLE Patients

The presence of antineuronal antibodies in SLE was first reported by Quismorio and Friou in 1972 (6). These anticytoplasmic antibodies were present in 41% of patients with active neurologic disease, 24% of patients with nonactive neurologic disease, and 9% of patients without SLE. Wilson et al in 1979 (7) demonstrated a correlation between the presence of warm reactive IgG antibrain antibodies and diffuse CNS dysfunction. However, no correlation of IgG antibodies was found with focal neurologic deficits or with psychosis. Bluestein in 1978 (8) demonstrated that the titer of serum cytotoxic antibodies was significantly higher in patients with CNS disease than in patients with renal, serosal, or dermal disorders. He also found that both IgM and IgG antibodies reacted with human neuronal cells and mediated their lysis. Although serum from 75% of all SLE patients had IgM antibodies, only 50% of the patients studied had neurologic disease.

Elevated levels of antineuronal antibodies cross-reacting with erythrocytes, lymphocytes, glia, and gangliosides have all been reported (9). The correlation of these antibodies with active neurologic disease is quite variable throughout the literature.

Bluestein et al found that 75% of SLE-CNS patients had CSF IgG antineuronal activity, compared to less than 10% of non-CNS SLE patients (10). Patients with manifestations of psychosis, organic brain syndrome, and seizures were more likely to have antineuronal antibodies than those with anatomically localized lesions. Overall, 90% of SLE-CNS patients with diffuse findings had increased CSF IgG versus 25% of those with focal neurologic findings. It was also found that SLE patients with psychotic/schizophreniform and depression syndromes had serum synaptic vesicle protein kinase (SVPK) inhibiting factors, whereas patients with seizures, hemiparesis, and chorea did not (11).

If neuronal autoantibodies/factors are causally related to SLE-CNS disease, how do they acquire access to the CNS? The blood-brain barrier normally prevents serum proteins from coming into contact with cortical tissue. The integrity of the blood-brain barrier is maintained by the intimate apposition of endothelial cells with tight junctions and small cerebral vessels as well as by epithelial cells separating the ventricular space from the choroid plexus (12). Thus, for systemically produced antineuronal autoantibodies to gain access to the CNS they must traverse these barriers. Therefore, it is hypothesized that the pathogenesis of SLE-CNS disease requires the coexistence of serum antineuronal antibodies and a pathologic alteration of the blood-brain barrier mediated by immune complex deposition leading to neuron-antibody binding and subsequently disruption of neuronal function (9).

It has been argued, however, that if there were a leak in the blood-brain barrier one would expect to find a proportionate increase in CSF albumin to IgG, whereas in reality there is a proportionally higher CSF IgG-to-albumin ratio (13). Furthermore, it has been found that the blood-brain barrier may not be significantly disrupted in active SLE, as ascertained by measurement of Q albumin values. CSF immunoglobulin indexes were elevated even when the blood-brain barrier was intact (14). These data suggest an accelerated intrathecal rather than systemic synthesis of IgG in SLE-CNS disease. Thus, it has been proposed that possibly polyclonal B-lymphocyte activation within the CNS and not the systemic circulation may be the major source of antineuronal autoantibodies in SLE-CNS disease (14).

Thus, antineuronal autoantibodies may gain access to the CNS by (a) intrathecal CNS B-cell activation and antibody synthesis or (b) systemic synthesis of antineuronal antibodies or anti-

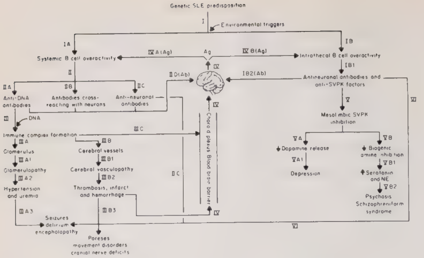
Genetic SLE predisposition
I
Environmental triggers
IA
IB
Systemic B cell overactivity
IV A (Ag)
Ag
IV B (Ag)
Intrathecal B cell overactivity
IV
IB1
II
II D (Ab)
IB2 (Ab)
Antineuronal antibodies and anti-SVPK factors
II A
II B
II C
Anti-DNA antibodies
Antibodies cross-reacting with neurons
Anti-neuronal antibodies
IV
V
VI
III
DNA
Mesolimbic SVPK inhibition
III C
Choroid plexus Blood brain barrier
Immune complex formation
III A
III B
V A
V B
Glomerulus
Cerebral vessels
↓ Dopamine release
↓ Biogenic amine inhibition
III A1
III B1
V A1
V B1
Glomerulopathy
Cerebral vasculopathy
Depression
↑ Serotonin and NE
III A2
III B2
II C
V B2
Hypertension and uremia
Thrombosis, infarct and hemorrhage
Psychosis Schizophreniform syndrome
III A3
III B3
IV
Seizures delirium encephalopathy
VI
Pareses movement disorders cranial nerve deficits

Fig. Molecular theory accounting for SLE-CNS disease. For details see text. Ag, Antigen; Ab, antibody; CNS, central nervous system; SVPK, synaptic vesicle protein kinase; NE, norepinephrine.

erythrocyte, antilymphocyte, antiglial, or antiganglioside antibodies cross-reacting with neurons that penetrate a compromised blood-brain barrier.

The potential for antibrain antibodies to induce neurologic dysfunction is supported by the findings that exposure of brain to exogenous heterologous antibrain antibodies produces seizures and cognitive and memory dysfunction (15, 16). In the following section it is hypothesized that neuronal antibodies are causally related primarily to the CNS symptoms of thought and affective disorders. That most CNS patients with all sorts of nervous system manifestations, as well as many non-CNS SLE patients, have antineuronal antibodies does not necessarily implicate autoantibodies in the etiology of the entire spectrum of CNS disease. In these other entities the presence of antineuronal autoantibodies may be synthesized secondarily in response to vasculopathic-induced ischemic cell damage and destruction and release of neuronal antigens.

Molecular Theory Accounting for SLE-CNS Disease Diversity

Some molecular events may explain the origin of the diverse neurologic and serum abnormalities in SLE (see Fig.). At the outset, individual genetic predisposition in combination with environmental triggers (I) leads to B-cell augmentation and differentiation systemically (IA) and/or intrathecally (IB). Combinations of genetic predisposition and specific environmental triggers determine the extent, nature, preponderance, and type of systemic or intrathecal B-cell populations. The susceptibility of certain patients to specific neurologic manifestations may be due to triggering of specific systemic or intrathecal B cells.

The polyclonal systemic B-cell activation (IA) leads to synthesis of a plethora of autoantibodies (II), including anti-DNA antibodies (IIA), antierythrocyte and antilymphocyte antibodies which cross-react with neurons (IIB), and antineuronal antibodies (IIC). The formation of anti-DNA antibodies (IIA) and of immune complexes (III) induces immune complex disease.

Immune complexes may induce pathology and damage to renal glomerulus (IIIA), cerebral arterial and venous vasculature (IIIB), and choroid plexus and blood-brain barrier (IIIC). Immune complex deposition on the glomerular basement membrane leads to renal disease, which can independently lead to uremia and hypertension (IIIA1–2), which can, in turn, induce nonspecific CNS manifestations such as uremic and/or hypertensive encephalopathy, delirium, or generalized seizures (IIIA3). These symptoms are usually reversible and responsive to treatment of the uremia and hypertension.

Immune complex deposition in small cerebral vasculature leads to vasculopathic-induced ischemia, thrombosis, hemorrhage, and infarct, which leads to focal or diffuse neurologic damage (IIIB1–3) accounting for pareses, focal psychomotor or generalized seizures, encephalopathies, cranial nerve deficits, and movement disorders. The precise focal neurologic deficit depends on the precise area of cortex, internal capsule, brain stem, or basal ganglia area deprived of its vascular supply secondary to vasculopathy. These focal deficits have been highly correlated with specific pathologic findings and thus can be explained predominantly by a vascular etiology. This is confirmed by the findings that (a) patients with focal findings are less likely to have CSF IgG antibodies (10) and (b) SVPK inhibiting factor was not found in SLE patients who predominantly had focal pareses, seizures, nonspecific change in mental status, organic mental syndrome, encephalopathy, or nonspecific bizarre behavioral changes (11). Thus, it is likely that vascular immune-complex-mediated disease can almost entirely explain the etiology of these symptoms. The small number of persons with these manifestations in which no vasculopathy was found may mean that small vasculopathy may have gone undetected or that systemic or intrathecal antineuronal antibodies (IIC and VI) may account for a minority of these manifestations.

Once focal or diffuse neuronal damage is induced by immune-mediated cerebral vasculopathy (IIIB1–3) neuronal alteration, destruction, and death ensue, with resultant release of neuronal antigens (IV). This would further activate local intrathecal B cells (IVB), with resultant production of more intrathecal antibodies (IB1) exacerbating cell destruction and lysis if neurocytotoxic antibodies are synthesized (IB2) and interfering with specific neural cell functions depending on the specific antibodies produced, and possibly laying the seeds for future selective antibody responses. Furthermore, the presence of focal brain injury and disruption of the choroid plexus and blood-brain barrier by immune complexes (IIIC) and focal vasculopathy (IIIB, IV) leads to spillage of neuronal antigens into the systemic circulation (IVA), augmenting systemic activation of B cells and systemic production of antineuronal autoantibodies (IIC) as well as antibodies cross-reacting with neurons (IIB). In the face of the already compromised blood-brain barrier disruption these antibodies now enter the CNS (IID) and induce lysis, destruction, and functional compromise of neurons, once again releasing more neuronal antigens stimulating intrathecal (IVB) and systemic (IVA) B-cell activation and proliferation, thereby augmenting the continuous and unremitting cycle of antibody synthesis and activation.

Thus, we see multiple parallel pathways for the synthesis of antibodies that react with neurons. Antibodies may be produced intrathecally or systemically and may be either specifically antineuronal or directed at other antigens that cross-react with neurons. These antibodies may have specific effects on neuronal enzymes, receptors, or transmitters or nonspecific cytotoxic effects.

The SLE-CNS manifestations of depression and psychotic/schizophreniform syndromes can be accounted for by the synthesis of specific antineuronal autoantibodies/enzyme regulating factors. These thought and affective disorders, particularly in the absence of SLE, have been attributed to alteration in the quantity of specific neurotransmitters in the mesolimbic brain. It has been hypothesized that overactivity of the dopaminergic system leads to psychosis/schizophrenia, whereas deficiency of monoamines such as serotonin and norepinephrine (17, 18) leads to depression. In the absence of SLE these states are due to diffuse biochemical abnormalities in the mesolimbic structure and cannot be produced by discrete, isolated focal vascular lesions. Thus, symptoms of depression, psychosis, or schizophrenia in SLE may be caused by induction of similar abnormalities in the mesolimbic brain. Organic mental syndrome, nonspecific behavior changes, encephalopathy, and delirium are all relative indicators of CNS dysfunction and could be accounted for by any diffuse nonspecific brain insult. The specific thought and affective disorders are postulated here to be due to specific antineuronal antibodies (V).

Would exposure of the mesolimbic system to any antineuronal antibody induce thought and affective disorders? It has been theorized that antibrain antibodies are potentially capable of inducing and causing CNS disease because intraventricular or suboccipital injections of these antibodies induced seizures and cognitive and memory impairment (15, 16). These manifestations, however, are nonspecific and reflect diffuse cerebral disturbance which can be induced by antibrain antibodies as well as by uremia, ischemia, hypertension, and brain edema (3). Thus to account for the antibody-induced etiology of thought and affective disorders in SLE we must implicate a specific antineuronal antibody with specific effects, not one which would lead to general, ubiquitous neuronal dysfunction/destruction.

Antibodies directed against presynaptic components that are responsible for neurotransmitter release might account for these manifestations. It was found that SLE patients with depression, psychosis, and schizophreniform syndromes had the highest levels of SVPK inhibition compared to all other SLE-CNS patients (11). Radioimmunoassay studies also confirmed that these patients had high levels of IgG antibrain synaptic vesicle antibodies. (See Part 1 of this article). SVPK is a calcium/calmodulin–activated protein kinase which has been implicated in neurotransmitter release (11). Conceivably binding of an antibody to synaptic vesicle protein kinase could inhibit activation of this enzyme and hence prevent neurotransmitter release. This would lead to decreased release of monoamines in specific neuronal pathways and hence could account for depression (VA,VA1). Inhibition of release of inhibitory neurotransmitters operant on mesolimbic biogenic amine pathways could lead to subsequent increase in serotonin and norepinephrine release and hence to the psychotic/schizophreniform syndrome (VB1–2).

Thus far, SVPK is the only presynaptic membrane component involved in neurotransmitter release investigated vis-à-vis SLE-CNS disease. Conceivably, specific antibodies directed at pre- or postsynaptic neurotransmitter receptors, ion channels, or enzymes involved in neurotransmission could lead to alteration in neuronal communication and hence alteration in behavior.

This theory can account for much of the diversity found in SLE-CNS disease and the presence of antineuronal antibodies in patients with and without CNS disease. Certain patients with SLE without CNS symptoms may have detectable neuronal antibodies in serum or CSF which may not produce clinical symptoms because (a) they do not specifically interact with and/or interfere with cell function and communication (similarly, anti-DNA antibodies are not known to specifically interfere with cell division), or (b) there is no concomitant blood-brain barrier disturbance to allow entry of systemic antineuronal antibodies, and there is absent or negligible intrathecal antineuronal antibody synthesis.

Patients with SLE-CNS disease secondary to vasculopathy with the initial manifestations of seizures, pareses, or movement disorders may have detectable nonspecific antineuronal antibodies synthesized as an expression of neuronal antigens released as a result of ischemia and cellular destruction. Thus, these patients' antibodies are not the initiators of the disease process but rather the end result of it and are markers for neuronal damage and death. These antibodies probably do not specifically interact with key neurotransmitter-release-related proteins. Manifestations such as movement disorders and cranial nerve deficits in which pathoanatomic correlation is high but not 100% could be the final common expression of two disparate mechanisms mediated either by antineuronal antibodies or vasculopathy, or by a combination.

The development of SLE-CNS manifestations is as complex and multifaceted as the development of SLE itself, and a multitude of different molecular pathways can lead to the same or diverse CNS dysfunctions. The final clinical expression of CNS disease in different patients and in different flareups in the same patient is dictated by the permutations of the underlying genetic predisposition, environmental triggers, specific systemic and intrathecally produced antibodies, diversity and extent of vascular events, and the ensuing damage. This theoretic model may facilitate therapeutic management. Patients with thought and affective disorders with specific brain-enzyme-inhibiting factors would probably be more likely than patients with vascular-induced symptoms to benefit from plasmaphoresis.

SLE-CNS Disease: Model for Mental Disease?

Although the etiology of mental disease is complex and involves a multitude of possible molecular derangements, an abnormality of the immunologic system, although not causally involved, may be common to these diseases. A variety of immunologic abnormalities such as increased antinuclear and antibrain antibodies have been reported in conjunction with mental illness, particularly schizophrenia (18). Clear-cut evidence, however, for any etiologic role of antibodies in the pathogenesis of this disease is lacking.

Prior hypotheses concerning the etiology of thought and affective disorders have emphasized the alteration in the absolute quantity of specific neurotransmitters, enzymes, and receptors and their regulation (17). An important molecular derangement, not yet fully explored in the etiology of mental disease and exemplified by SLE, is the possible derangement of the presynaptic enzymes involved in neurotransmitter release. Although in SLE there is an exogenous factor (probably autoimmune) leading to SVPK inhibition which may lead to thought and affective disorders, it is quite conceivable that non-SLE thought and affective disorders involve an endogenous underlying genetic defect in the structure or conformation of SVPK or of other key presynaptic enzymes and components leading to alterations in the quantity of specific mesolimbic neurotransmitters released and hence alterations in behavior. Thus all thought and affective disorders may be brought about by a common molecular defect (e.g., SVPK inhibition) induced by disparate mechanisms—exogenous and autoimmune in SLE and endogenous-genetic in the absence of SLE. Behan and Geschwind demonstrated that fetuses of SLE mothers had increased neurologic abnormalities such as dyslexia and an increased incidence of left-handedness (19). They hypothesized that these findings could be explained by an interference in fetal neuronal cellular migration associated and correlated with anti-ro antibodies. Cell migration and function are ordinarily under control of second messengers such as cyclic AMP. The interference in embryonic neuronal migration in SLE fetuses may be due to antibodies directed against brain protein kinases which are transported across the placenta and subsequently induce fetal neurologic abnormalities.

Patients with autoimmune diseases and CNS symptoms other than SLE, such as myasthenia gravis, amyotrophic lateral sclerosis, and depression without SLE, also had detectable brain protein-kinase-inhibiting factors, although with far less frequency and lower titers (11). This raises the question of the possible common autoimmune nature of these diseases, as well as the possibility of presynaptic molecular derangements in depression, myasthenia, and ALS not yet explored. SLE occasionally presents with myastheniclike symptoms (3). One wonders if there are presynaptic autoimmune mechanisms common to both diseases.

Further exploration of the molecular derangements of SLE-CNS disease may clarify the etiology of SLE and CNS diseases and may lead to the formulation of presynaptic models of CNS pathology and, one hopes, to advances in diagnosis and treatment of these diseases.

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Acute Thrombosed External Hemorrhoids

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Abstract

From 1981 to 1985, 159 patients with acute thrombosed external hemorrhoids were treated by the author. This condition is relatively common in young persons; the mean age of the 159 patients in the series was 36 years. The condition was often preceded by a bout of constipation. The incidence was higher in male than in female patients, the ratio being 2:1. These hemorrhoids were slightly more prevalent on the left side (51%), whereas ordinary internal hemorrhoids tend to develop more on the right side (61%). I have postulated that the stagnation of blood and trauma to the anal vessels due to strain is the common denominator in the development of thrombosis. Therefore a rational approach to the condition is to eliminate stasis, trauma, and excess strain. Since the excess strain during defecation is usually caused by constipation, softening the stool is the key to preventing excessive strain. The condition is usually self-limiting and subsides in a few days to a week. If the condition fails to respond to conservative treatment, complete surgical excision of the thrombus is necessary.

The sudden onset of anal pain due to acute thrombosed external hemorrhoids is relatively common in young active persons: it is frequently preceded by a bout of constipation and can interfere with the pursuit of daily activities. To explore the rational approach to this condition on the basis of pathogenesis, I present an analysis of clinical data from my own experience.

Clinical Material and Results

From 1981 to 1985, 159 cases of acute thrombosed external hemorrhoids were treated at my private office. Cases of diffuse engorgement of external hemorrhoids and strangulated hemorrhoids were excluded. There were 104 male and 55 female patients ranging in age from 13 to 71 years (mean, 36 years). The majority of patients were between the ages of 20 and 40. The duration of disease was from one day to two weeks, with an average of five days. The constipation was a preceding condition in the majority of patients, diarrhea in a few, but some patients reported no predisposing factors. The total number of thrombosed hemorrhoids was 193 in 159 patients, 140 from single hemorrhoids in 140 patients, 18 from double hemorrhoids in 9 patients, and 35 in 10 patients who had recurrences. Of the total of 193 hemorrhoids, 98 (51%) were located on the left side of the anus, 89 (46%) on the right side, and the remaining 6 (3%) in the midline.

A total of 102 patients (64%) were treated conservatively, 52 (33%) by evacuation of thrombus and 5 (3%) by evacuation of thrombus and internal sphincterotomy for patients with recurrent attacks of thrombosis. The objective of the treatment is to improve the quality of life in the simplest, safest, and most economical way. When the pain is not severe and swelling is subsiding, the condition is managed conservatively. When the pain is severe and the hematoma is tense, surgical evacuation is considered.

Conservative treatment included frequent hot baths, mild sedatives, maintaining soft bowels with bulk diet, and confinement to bed for a few days if possible. Usually within 2–3 days, most of the pain subsides and the patient may then be able to return to work. The thrombus continues to be absorbed; complete resolution will take place in 2–3 wk and leaves a residual skin tag. Occasionally, central ulceration overlying

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tense skin may develop, and spontaneous discharge of clot or fluids is observed. Simple extraction of clots through the existing wound enables the remainder of the course to be smooth and comfortable. When a patient fails to respond to conservative treatment or has a very acute painful hematoma, surgical treatment is preferable.

The purpose of surgical treatment is to relieve the acute pain by eliminating the tension by removal of blood clots and fluids. Simple incision and evacuation of clots is effective in relieving pain but often leads to reaccumulation of blood because the clots are usually multiple and encapsulated with the vascular wall. Therefore, it is advisable to remove the clots completely along with excision of the vascular wall and excess skin. The wound is packed with surgicel for a few hours to overnight. Usually it heals within a few days to a week.

For the purpose of comparison, I have reviewed 803 cases of patients on whom I performed hemorrhoidectomy for ordinary hemorrhoids during the same period of time. There were 482 male and 321 female patients; male-to-female ratio was 6:4. The age range was from 28 to 82 years, mean age was 48 years, and the majority of patients were between 40 and 60 years of age. Most of the hemorrhoids were located in the usual sites: right posterior, right anterior, and left lateral of the anus. A total of 524 patients had three hemorrhoids, 31 had four, 195 had two, and only 53 patients had one hemorrhoid—a total of 2,139. The distribution of 2,139 hemorrhoids was 1,305 (61%) on the right and 834 (39%) on the left side.

Discussion

Numerous articles on internal or combined hemorrhoids have been published (1) but few deal with external thrombosed hemorrhoids. Since the thrombosed hemorrhoid is quite common, particularly in young persons, and often causes considerable discomfort, it is worthwhile exploring effective management of the disease on the basis of its pathogenesis. The common sites of internal hemorrhoids are the right posterior, right anterior, and left lateral. Thus there are always more hemorrhoids on the right than on the left side, as demonstrated in my series of 803 patients (61% on the right, 39% on the left). However, the thrombosed external hemorrhoid is quite different from the internal hemorrhoid, with a slight prevalence on the left side (51% on the left and 46% on the right). Also, internal hemorrhoids usually develop slowly over the course of many years, whereas thrombosed hemorrhoids always occur suddenly. These facts suggest that the developmental mechanism of thrombosed hemorrhoids differs from that of internal hemorrhoids.

The etiology of internal hemorrhoids is unknown, but the act of defecation is probably closely related to their development. During defecation, intraabdominal pressure rises and at the same time the internal sphincter relaxes, creating a reverse pressure gradient of high portal pressure and low anal pressure. The direction of blood flow is now changed from the portal system to the internal hemorrhoidal vein, resulting in dilatation of its vein, the internal hemorrhoidal plexus. Furthermore, when hard fecal matter is impacted at the anorectal ring (anal inlet), congestion of the internal hemorrhoidal plexus may be aggravated by continuous arterial flow to the anal canal while the venous return is rapidly cut off. Repetition of this pattern for many years causes temporary engorgement of the internal hemorrhoidal plexus to become permanent, and thus the pathologically dilated plexus may elevate the overlying mucosa into the anal lumen beyond. Once this stage is reached, prolapse of hemorrhoids may occur with bowel movements (2, 3).

The pathogenesis of thrombosed external hemorrhoids is not clearly understood. It is believed to be due to the rupture of an external vein caused by straining during defecation, which results in the formation of a tense, painful perianal hematoma (4). However, Thomson (5) claims that the clot formation is not in extravascular space but within the lumen of vein because the clot has an endothelial covering. Similar findings were reported by Ganchrow et al. (6); following extensive histologic studies of 130 patients, they too found all thrombi were within the wall of the vessel. They postulated that the mechanism of thrombogenesis is based on stasis and local trauma. The stasis prevents dilution of blood coagulation factors by blood flow. With trauma, tissue thromboplastin may be released to activate the extrinsic system. The platelets then can also be exposed to collagen to activate the intrinsic clotting system. Thus, in the presence of stasis and absence of normal flushing clotting factors, thrombus formation probably occurs.

Since the thrombosed external hemorrhoids had a slight prevalence on the left side, it is also interesting to hypothesize a possible relationship between the sigmoid colon and the pathogenesis of external thrombosed hemorrhoids. The sigmoid colon is known to cross over the left internal iliac vein. When the sigmoid is distended with stool, it compresses the left internal iliac vein, thereby diminishing drainage of blood from the inferior hemorrhoidal vein. The trapped blood in the left inferior hemorrhoidal vein may promote formation of a clot when damage to the endothelium occurs during defecation. However, the distended sigmoid colon poses no threat to drainage of right inferior hemorrhoidal veins. This might explain the cause of the prevalence of left-side thrombosed hemorrhoids. Our view is shared by Cleave (7), who felt that the left-sided preponderance of varicose veins and deep vein thrombosis was due to the close anatomic relationship between the left external iliac veins and the sigmoid colon. He argued that the left-side colon exerted "minimal but significant pressure" on these external iliac veins.

It is now clear that the common denominators for the development of thrombosed hemorrhoids are stasis and local trauma. Sudden exertion of strenuous strain into the anus during defecation may produce stagnation of blood and trauma to the anal vessel and facilitate formation of blood clots. The bowel movements can only be achieved through keen coordination of all anorectal structures, particularly the internal anal sphincter (8). When rectal pressure is higher than anal pressure, the internal sphincter relaxes and permits the passage of stool. High anal pressure may lead to more straining and prolonged defecation time. According to Arabi et al, the resting anal pressure is higher in men than women, and even higher in young persons than old persons of the same sex (9). This may explain the higher incidence of thrombosed hemorrhoids in men than in women (2:1 ratio), as well as the common occurrence of the condition in young persons. Thus, a rational approach to management of thrombosed hemorrhoids is to eliminate stasis, trauma, and excess strain. Since the excess strain during defecation is usually caused by constipation, softening the stool is the key to prevention. Occasionally, explosive diarrhea may precede the development of thrombosed hemorrhoids; therefore, care must be taken to avoid diarrhea. Thrombosed hemorrhoids are usually self-limiting and subside in a few days to a week. If the patient fails to respond to conservative treatment, surgical intervention is necessary, as described previously. If recurrence is frequent and causes considerable discomfort, it might be advisable not only to remove the clots, but also to lower the anal pressure with internal sphincterotomy in order to minimize strain.

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Value of Hepatic Blood Flow Study in the Diagnosis of Hepatoma

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Abstract

A case of hepatoma was diagnosed by means of radionuclide hepatic blood flow study (hepatic scintiangiography) and static liver-spleen imaging. The hepatic flow study clearly showed arterial blood supply to the right lobe of the liver and provided a strong indication for the diagnosis. Sonographic examination indicated some abnormalities but was less conclusive than radionuclide studies. Subsequent contrast angiogram, computerized tomography scan, positive hepatitis B profile, very high alpha-fetoprotein test, and laparatomy confirmed the diagnosis.

Case Report

A 29-yr-old Korean man was admitted to the hospital with chief complaints of mild fever, right-upper-quadrant abdominal pain, and vomiting. The patient was a performing artist from Korea on U.S. tour prior to the admission. Physical examination revealed a well-developed, thin man, alert and cooperative, but somewhat apprehensive. The liver was palpable about two fingerbreadths below the right costal margin. No nodularity or mass was palpated. There was ascites, and paracentesis yielded bloody abdominal fluid. Otherwise the physical examination was unremarkable.

Complete blood cell count revealed hemoglobin 8.9 g%, and the patient received 3 units of packed red blood cells. A liver function profile revealed total bilirubin 2.8 mg/dL, direct bilirubin 0.7 mg/dL, alkaline phosphatase 420 U/L, SGOT 600 U/L, and SGPT 236 U/L. Sonogram of the abdomen revealed enlarged right lobe of the liver with questionable ascites, mass, and splenomegaly. No gallbladder disease was noted.

A radionuclide liver scan with hepatic flow study was performed after injection of 3 mCi of 99m-Tc-sulfur colloid. The liver flow study revealed early arterial perfusion of the right lobe of the liver simultaneously with the spleen (Fig. 1). The findings strongly indicated arterial blood supply to that portion of the liver. The static liver images (Fig. 2) revealed a large defect occupying the posterior half of the right lobe. The anterior view revealed no evidence of a space-occupying lesion, but it showed diffusely diminished colloid uptake mimicking diffuse hepatic parenchymal disease. However, in light of the hepatic flow findings, a careful examination of the RAO, right lateral, and posterior views revealed a huge space-occupying lesion in the posterior portion of the right lobe of the liver. Subsequently a contrast angiogram (Fig. 3) and a computerized-tomography scan (Fig. 4) confirmed these findings. A hepatitis B profile revealed the presence of HB_eAg, HB_sAg, and anti-HB_c. Anti-HB_e and anti-HB_s were not present. An alpha-fetoprotein tumor marker test revealed 390,500 IU/mL (normal <15).

The patient returned to Korea, where he underwent a hepatectomy. A large hepatoma, occupying most of the right lobe of the liver and invading the portal vein, was found. An extended right-lobe hepatectomy (trisegmentectomy) was performed. The patient, however, died of hepatic failure.

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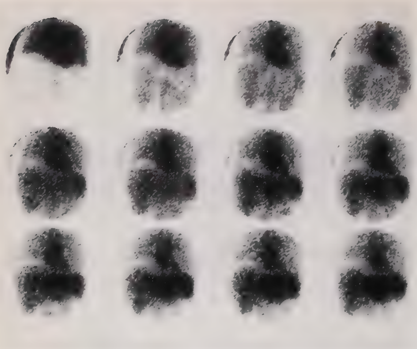

Fig. 1. Liver blood flow study. Early perfusion of right lobe is noted at same time as splenic perfusion (second image from left in top row), indicating predominant arterial blood supply. Flow images were obtained every 1.5 sec.

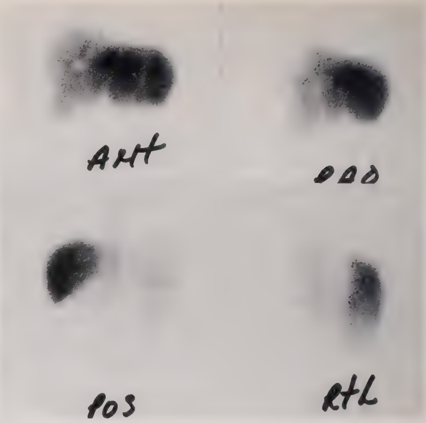

Fig. 2. Static liver images. Anterior view (**upper left**) shows no focal defect and diffusely diminished radiocolloid uptake. However, RAO (**upper right**), right lateral (**lower right**), and posterior (**lower left**) views reveal huge defect occupying posterior portion of right lobe.

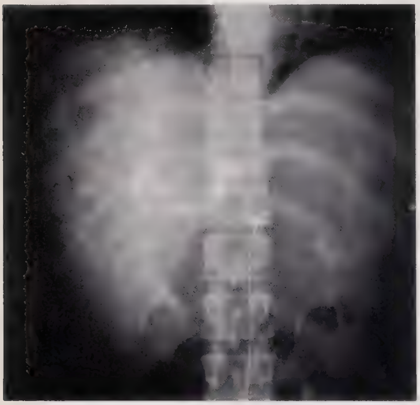

Fig. 3. Hepatic angiogram. Markedly irregular small vessels with tumor stain involve almost entire right lobe of liver.

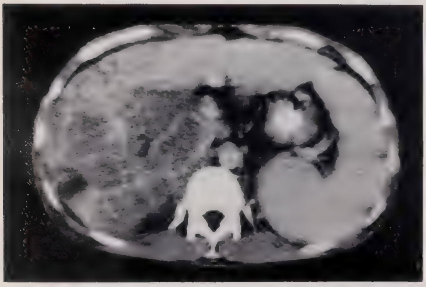

Fig. 4. Computerized-tomography scan of liver. Multiple conglomerate defects form huge space-occupying lesion in all but a small anterior portion of right lobe.

Discussion

Hepatic flow study has been utilized in diagnosing different entities such as superior vena caval syndrome, cirrhosis, and neoplastic tumors (1–4). Normal liver receives blood primarily through the portal vein; in scintiangiography, it visualizes several seconds after the descending aorta, kidneys, and spleen are visualized. In cases of hepatic tumor with predominant arterial supply the liver visualizes early in the arterial phase.

In our present case, the static view, at a glance, appeared nonspecific, and yielded no evidence of a space-occupying lesion, although it showed diffusely diminished uneven uptake throughout. However, given the knowledge of the predominant arterial blood supply to the right lobe obtained from the hepatic blood flow study, a careful examination of the static images revealed several findings that indicated a large space-occupying lesion: (a) The anterior view showed diffusely diminished activity, but (b) the posterior view showed only faint activity in the right-lobe area that indicates a large, overlapping mass lesion behind the relatively normal anterior portion of the right lobe, and (c) the RAO and right lateral views showed a large defect completely obliterating the posterior half of the right lobe.

Conclusion

In this unique case of a large posterior, hepatic space-occupying mass lesion with predominant arterial blood supply, the hepatic blood flow study provided the key findings leading to the correct diagnosis of the probable hepatoma.

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Mucosal Proctectomy and Ileoanal Anastomosis

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Abstract

The classical surgical therapy of ulcerative colitis and familial polyposis has been total proctocolectomy and ileostomy. In order to avoid a cutaneous stoma and to achieve continence without disruption of gastrointestinal continuity, responding to a demand particularly among younger patients, a mucosal proctectomy in association with an ileoanal anastomosis has been devised. The addition of an ileal reservoir proximal to the anastomosis results in fewer bowel movements and a greater degree of continence.

In our series of 70 cases, we have analyzed the normal roentgen anatomy of the ileoanal anastomosis and the proximal ileal reservoir and present our findings on plain film and contrast examinations. To assess patients postoperatively, the radiologist should be aware of the basic surgery involved and the normal roentgen anatomy resulting from this procedure.

Ileoanal anastomosis with rectal mucosectomy dates back to 1964 when Soave reported on the moderately successful use of this procedure for the treatment of Hirshsprung's disease (1). However, it was not until the late 1970s and early 1980s that numerous series of cases utilizing this technique for the treatment of ulcerative colitis and familial polyposis were reported (1–5).

Most patients undergoing this procedure maintain good fecal continence and ability to distinguish gas from fluid or solid contents. However, many patients experience urgency and frequency for months, with marked perineal excoriation unless an intestinal reservoir for storage is constructed proximal to the anastomosis (7–10).

Materials and Methods

Adequate preoperative management of the patient to ensure nutritional stability and a rectal mucosa completely free of inflammation is essential to the success of the procedure. Persistent inflammatory disease can lead to postoperative infection and breakdown of the anastomosis.

The surgical procedure consists initially of a total colectomy. The distal ileum is mobilized to provide access to the perineum. The rectum must be thoroughly irrigated and completely free of fecal contamination, otherwise a small tear in the rectal mucosa during the course of dissection will lead to destructive postoperative pelvic infection. Dissection of the rectal mucosa then proceeds directly on the rectal wall so as not to damage the hypogastric and parasympathetic nerves (2, 3).

The mucosa is dissected away from the underlying muscularis along the proximal 7–8 cm of rectum. The rectal mucosa is then everted and delivered outside the anus. The mucosa is incised just above the dentate line. A short rectal muscular segment is thus preserved. The terminal ileum is then pulled down through the muscular segment and a two-layer ileoanal anastomosis is performed at the dentate line (3–5). The ileum is sutured loosely at the upper open end of the rectum (Fig. 1). A temporary diverting ileostomy is created in the right lower quadrant.

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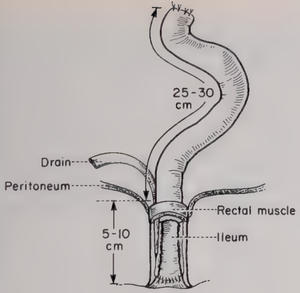


Fig. 1. After rectal mucosectomy resected end of ileum is seen anastomosed to distal rectum. A drain is evident within rectal cuff.

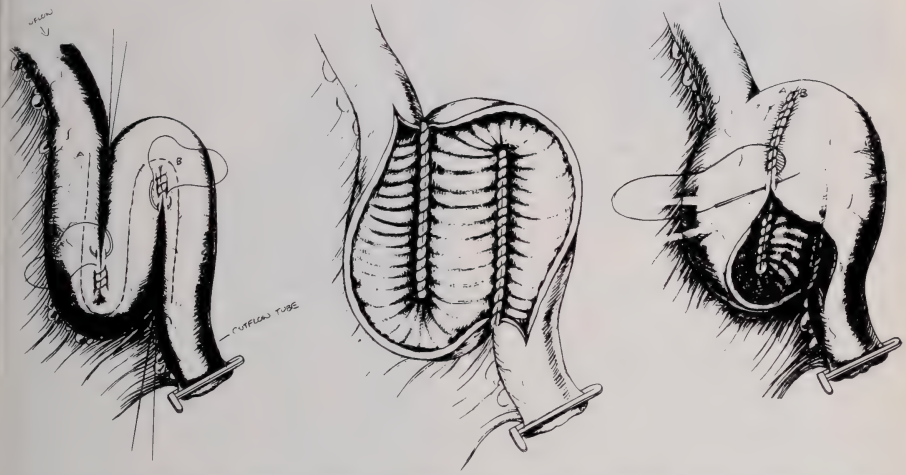


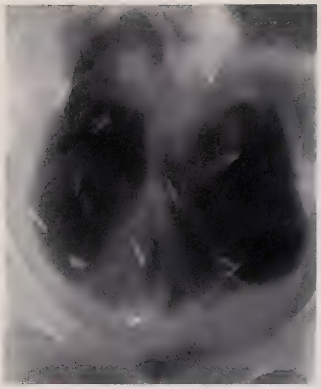
Fig. 2. Left S shape of distal ileum is evident with suturing of adjacent loops. Subsequent incision is defined by dashed lines. **Middle** Adjacent loops of bowel are then opened, demonstrating a flat intestinal plate. Inflow tract is superior, outflow tract inferior. **Right** Plate is closed from its superior to its inferior aspect. Efferent limb is then anastomosed to distal rectal segment.

The reported results indicate all patients continent of stool during the day, the number of bowel movements continuing to range from 7 to 10 and occasional incontinence at night. Also, 6–12 mo may be required for adaptation to continence (2–8 bowel movements per day).

To diminish intestinal transit, balloon dilatation of the ileum was attempted to create a so-called neorectum (6), with fair and good results, respectively, that is, about six bowel movements per day (in a small group of patients at 6 mo) and no significant complications. The addition of an ileal reservoir generally results in fewer, more-formed bowel movements and eventually none at night. The adaptation period also tends to be less protracted.

The ileal reservoir may be constructed in a number of ways. The lateral ileal reservoir consists of a side-to-side ileoanal anastomosis producing a pouch 20–30 cm in length (7). Only 8–10 cm of ileum extends to the anus. There are few complications secondary to the procedure.

The S-shaped ileal reservoir is constructed by flexing the terminal part of the ileum above the peritoneal reflexion into an S shape (Fig. 2) (8). After incision of the antimesenteric side of the three adjacent segments of the S-shaped loop for a distance of approximately 6–8 cm each, suture lines are placed to construct a single reservoir (Fig. 2). Because there is one antiperistaltic loop, this type of reservoir tends to get large and develops stasis. Although it provides for good



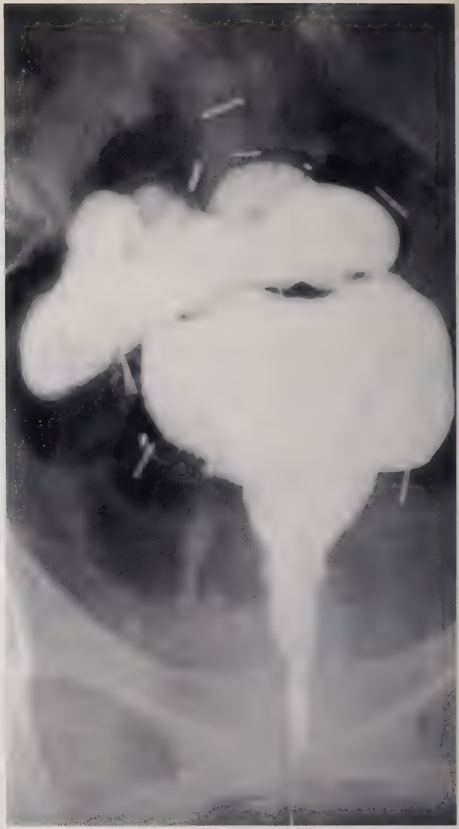


Fig. 3. Above Plain film of pelvis demonstrates a rounded, smooth, somewhat lobulated radiolucency with linear vertical densities representing air-filled pouch and suture lines within pouch.

Fig. 4. Right Mature pouch filled with barium is present within pelvis. Contours are smooth. Ileal folds are obscured by contrast medium. There is reflux into afferent small bowel.

storage, there tends to be poor evacuation, and catheter drainage may be required (9).

The J-shaped pouch consists of a J-shaped loop of distal ileum sutured, incised, and closed to form a sac directly anastomosed to the rectoanal junction (10). A diverting ileostomy is maintained for 4 mo before closure with any type of reservoir.

The majority of our patients undergoing total proctocolectomy and ileoanal anastomosis have had construction of an antiperistaltic or S-shaped pouch.

Results

Normal Roentgen Anatomy. Plain film examination of the abdomen will often reveal the mature pouch distended with air. The lobulated smooth oval structure with linear densities extending vertically within the pouch, representing the lines of suture, is readily differentiated from normal air-containing structures in the pelvis (Fig. 3). The rectosigmoid can be followed distally as an air column in the prone film and valvulae conniventes delineate any air-filled loops of small bowel in this area. Plain film examination in the early postoperative period fails to visualize the pouch because of the relatively small volume at this time owing to continuous drainage.

Contrast study of the ileoanal anastomosis and the internal reservoir may be performed with Gastrografin in the early postoperative period. Barium studies are reserved for delayed evaluation. Contrast material is introduced through an uninflated Foley catheter, which is inserted into

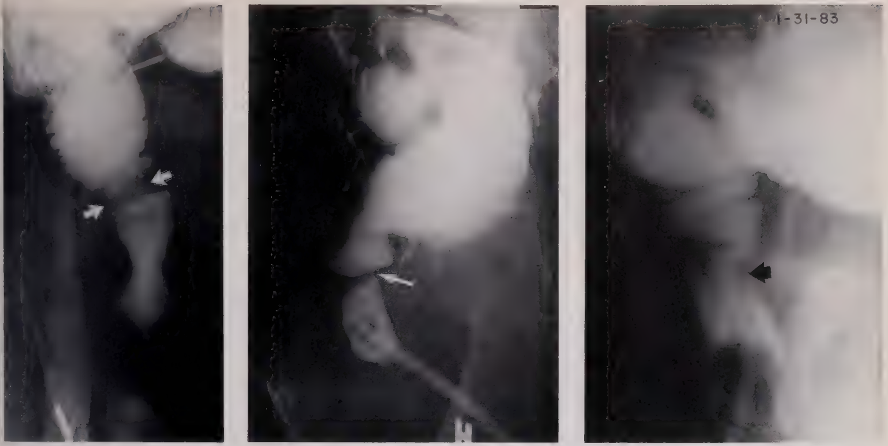


Fig. 5. Left Anteroposterior view clearly demarcates anastomotic site at junction of smooth rectal segment and smooth thin circumferential ileal folds (arrows). On retrograde administration of barium, oblique (**middle**) and lateral (**right**) views clearly demonstrate demarcation between thin, circumferential ileal folds and smooth tubular rectal segment. This represents anastomotic site.

the rectal segment. Examination performed by this route demonstrates the ileoanal anastomosis, the rectal segment, the efferent ileal limb, and the pouch, usually with reflux into the afferent ileal loop. After the Foley catheter is removed, the pouch capacity to empty may be tested as well as the quality of sphincter control.

Examination via the distal limb of the loop ileostomy is utilized primarily in the presence of rectal or anal stricture or a very painful perineal region. The demonstration of fistula from the pouch or ileoanal anastomosis to the skin or vagina is best seen on antegrade study.

Multiple views, including anteroposterior and both obliques and lateral films, must be obtained for complete evaluation.

The normal roentgen anatomy of the ileoanal anastomosis and pouch includes a tubular distal segment representing the rectal musculature, about 4 cm long and having smooth contours. It distends well in the presence of good sphincter control. The efferent ileal segment measures 7–10 cm and usually is designed to be less than 10 cm. If it is longer, there is a tendency to difficult evacuation of the pouch due to failure of adequate fixation of the distal small bowel. The pouch itself is a round-to-oval sac of variable volume usually increasing in size gradually over a period of months. The afferent ileal limb extends from the pouch proximally, usually from the superior lateral aspect.

After introduction of the contrast medium, retrograde flow is prompt. The anteroposterior view clearly demonstrates the pouch, which, when filled, is a smooth, oval or round, slightly lobulated, saclike structure initially of about 100 ml capacity. The mucosal pattern is that of normal ileum. The suture lines cannot be readily defined. Reflux into the afferent limb is usually apparent with free flow into normal-appearing small bowel at the right superolateral aspect of the pouch (Fig. 4). This view also delineates the efferent ileal loop demonstrating normal ileal folds. This loop may enter eccentrically or centrally to the base of the pouch (Fig. 5). The distal segment of the efferent loop is tubelike but assumes a funnel shape as it enters the pouch. The actual rectal segment is often difficult to demonstrate because the Foley catheter may have been inserted beyond the anastomosis. This problem is eliminated by placing only the tip of the catheter through the anus. In addition, the rectal segment may be visualized after the catheter is removed and the patient is asked to evacuate. Opacification occurs even though evacuation pressure is somewhat limited because of the presence of the diverting ileostomy. After evacuation in the absence of stricture or perirectal inflammatory disease, there is usually at least partial emptying of the pouch.

In the lateral and oblique views, the rectal segment is clearly seen as a smooth tubular structure considerably anterior to the sacrum (Fig. 5). At the level of the anastomosis the efferent ileal loop with smooth, thin mucosal folds is seen to expand symmetrically as it proceeds to the pouch. The pouch, when filled, is seen extending anteriorly into the pelvis. Under normal conditions the potential space between the lateral wall of the rectal tube and the efferent limb is obliterated and not visualized on contrast study. Occasionally, however, the efferent loop may be defined by contrast material in the rectal cuff.

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Arterial Flow in Venous Volume Studies

E. CONVERSE PEIRCE II, M.D., AND HARRY SCHANZER, M.D.

Abstract

The rate of venous refilling after exercise is commonly used in noninvasive exercise tests to assess chronic venous regurgitation. Volume refilling is the sum of venous regurgitation and arterial blood flow. Our hypothesis is that volume data do not accurately measure regurgitation unless blood flow is known. Foot volume data after exercise and elevation were obtained, using the mercury-in-silastic strain gauge, for 68 control and 131 extremities with venous disease. Measured values for the time of half-volume refilling were compared to values corrected for arterial flow. The arterial flow accounted for virtually half the volume change, but showed wide and unpredictable variations. Corrected times of half-volume refilling had significantly narrower variations and regurgitation was better estimated ($p < 0.001$). For regurgitation to be comparable between patients or over time in venous volume tests, arterial flow must be determined.

Noninvasive tests based on volume changes (or skin blood vessel content in photoplethysmography) are now frequently used to evaluate chronic venous disease (1–8). The time for volume refilling after exercise (active or passive) is the parameter most widely utilized as a measure of regurgitation. The magnitude of the volume change is generally considered less meaningful. The rate of volume refilling is a function of both arterial inflow and venous regurgitation. For that reason, we have been measuring the foot blood flow in all control subjects and patients since November 1983 when performing foot plethysmographic studies with the mercury-in-silastic strain gauge. We have studied means of correcting raw data for the measured foot arterial blood flow. In addition, we have also made measurements after elevation (Trendelenburg) (9, 10). The principal hypothesis addressed here is that blood flow should be measured and corrections made for it if plethysmographic data in patients are used to determine venous regurgitation.

Materials and Methods

Plethysmographic studies were carried out in both control subjects and patients with venous disease. (The equipment for the mercury-in-silastic plethysmographic studies was obtained from D. E. Hokinson, Inc., 2450 Newport Way S.E., Issaquah, Washington 98027.) The classification of the venous disease was made on the basis of all information available (history, physical examination, plethysmographic data, and, in many cases, venographic studies and operative findings). The categories of the 199 extremities included in this study are listed in Table 1.

Measurement of Arterial Foot Blood Flow. With the subject lying relaxed on his or her back, a snug mercury-in-silastic transducer was placed around the midfoot bilaterally and secured with tape. The transducers were balanced and standardized so that 1 cm on the strip chart was equal to a 1% circumferential change (and the same percentage volume change). Since the foot is not cylindrical, circumferential and volume change measurements are approximations. Periodic strip chart records were made at 1 mm/sec after rapid complete venous occlusion with a pneumatic ankle tourniquet. The slopes of the traces represented arterial flow in ml/100 ml tissue/min.

Basic Exercise Test. The exercise test was carried out with the subject sitting. The subject flexed the foot alternately plantar and dorsally

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TABLE 1

Definitions of Experimental Categories and Number of Limbs Evaluated

Category	No. limbs	Definition
Normal, control	68	No history or finding suggestive of venous disease for either lower extremity
Varicose veins	25	Well-delineated varices associated with either greater or lesser saphenous system and no evidence of disease in deep or communicating veins
Poor muscle pump	22	Volume moved on exercise is below the normal range; no evidence of significant varices or deep or communicating insufficiency
Insufficiency of perforator veins	19	Symptoms and signs of chronic venous insufficiency; no evidence of disease in deep veins
Insufficiency of deep veins	38	Major signs and symptoms of venous disease; clear-cut evidence of deep regurgitation
Obstruction of deep veins	30	Major signs and symptoms of severe venous disease, surgical history or venographic demonstration of obstruction, regurgitation not sufficient to explain findings

about once a second for 15 sec while a strip chart record of foot volume was made. The total volume change during the test and the time interval for one-half-volume refilling were measured on the tracing.

Elevation or Trendelenburg Test. With the subject lying on his or her back, the patient's lower extremities were elevated about 60 degrees (not critical) until volume change was nearly complete (usually about 15–20 sec), after which the patient sat up and relaxed while a record was made as in the exercise test. Total volume change and time for half-volume refilling were measured.

The volume change on exercise was generally converted to the percentage of the volume change on elevation (approximately the maximum change in venous volume).

Using the formulas (Table 2) and a simple computer spreadsheet, all other necessary calculations for both exercise and elevation tests were made. The time for half-volume refilling was corrected to our mean control foot blood-flow value; the total rate of foot volume change and the rate of regurgitation were determined.

Statistical Analysis. Means and standard deviations (SD) were computed for each group. The probability that group differences were significant was determined using Student's unpaired *t* test.

Results

In the summary data for exercise and elevation tests in all groups (Table 2), all parameters (except calf perforator insufficiency volume in exercise) in the clinical groups differed significantly from their control counterparts for both exercise and elevation tests ($p < 0.001$).

The most discriminating differences in the exercise tests were total volume, rate of regurgitation, and the time of half-volume refilling. In the elevation tests, rate of regurgitation and time of half-volume refilling were the most discriminating. In the control groups and in most disease categories the correction of the time of half-volume refilling to our mean arterial blood flow reduced the data variability.

Data on foot arterial blood flow rate for exercise in controls and subjects with all disease categories (Table 3) revealed significant differences between groups, but the most striking finding was the more than tenfold range in each group.

The value of correcting measured data for blood flow was most apparent when arterial foot blood flow values differed considerably between two tests in the same subject or arterial blood flow approached the upper or the lower end of the blood flow range.

The value of the total volume change with exercise was enhanced if the numbers were converted to percentage of corresponding volume change with elevation (considered to represent the maximum venous emptying volume).

Selected paired tests (Table 4) compare basic data and values corrected for blood flow in 5 patients exemplifying a variety of circumstances.

For patient 1, a control subject aged 50 yr and athletic, the tests were 4 mo apart. The 11/83 data, uncorrected for blood flow, suggest moderately severe venous regurgitation, but are actually due to the high foot blood flow. Corrected data show no venous regurgitation.

For patient 2, a pregnant control subject, postpartum findings suggest venous insufficiency but, corrected for blood flow, show no regurgitation. Low exercise volume indicates a poor calf muscle pump (probably effort related).

Patient 3 was thought to have deep venous insufficiency on the left because of ankle edema. Pain on left ankle motion limited the patient's mobility. Data, corrected for the measured high foot blood flow, indicated no significant venous regurgitation, but a poor calf muscle pump secondary to the ankle pain.

Patient 4 had had ligation of the left iliac vein following surgical injury. In the 9/84 study, there was improved volume movement by the calf muscle pump, indicating good compensation for the obstruction despite development of significant venous regurgitation during exercise (not, however, after elevation).

TABLE 2

Measured and Calculated Parameters for Exercise and Elevation Tests (Mean ± SD)

	Measured			Calculated		
	Exercise vol. change (%)	Time ½ vol. return (sec)	Arterial flow foot (ml/min‡)	Rate vol. change (ml/min‡)	Rate regurgitation (ml/min‡)	Time ½ vol. corrected (sec)
Exercise test*						
Control	2.1 ± 0.8	29.9 ± 30.9	2.0 ± 1.4	3.2 ± 1.8	1.2 ± 1.3	21.9 ± 11.1
Varicose veins	1.6 ± 0.6	13.1 ± 9.4	2.6 ± 2.3	5.0 ± 3.3	2.4 ± 2.5	13.9 ± 8.9
Poor calf pump	0.9 ± 2.1	12.8 ± 6.2	1.5 ± 0.7	2.5 ± 1.0	0.9 ± 0.7	9.5 ± 2.1
Perforator insuff.	2.1 ± 0.9	8.5 ± 3.5	2.8 ± 1.7	7.7 ± 2.7	4.8 ± 2.2	10.1 ± 6.6
Deep insufficiency	1.3 ± 0.6	3.6 ± 1.5	3.9 ± 1.9	12.0 ± 6.1	8.2 ± 5.2	4.1 ± 2.2
Deep obstruction	0.9 ± 0.7	9.0 ± 8.9	1.7 ± 1.2	4.0 ± 3.6	2.3 ± 3.2	6.6 ± 4.7
Elevation test (Trendelenburg)†						
Control	3.1 ± 0.9	46.0 ± 36.4	2.2 ± 1.5	2.9 ± 1.4	0.7 ± 0.8	35.8 ± 13.3
Varicose veins	3.6 ± 1.3	28.5 ± 17.4	2.4 ± 1.6	5.1 ± 3.9	2.6 ± 3.0	28.7 ± 15.4
Poor calf pump	2.5 ± 0.6	34.0 ± 16.2	1.6 ± 0.8	2.7 ± 1.4	1.1 ± 1.1	25.9 ± 7.4
Perforator insuff.	4.5 ± 1.6	22.3 ± 8.3	2.8 ± 2.0	6.8 ± 3.5	4.0 ± 2.5	23.8 ± 7.8
Deep insufficiency	3.9 ± 1.3	11.5 ± 6.7	4.1 ± 1.7	12.5 ± 6.0	8.4 ± 5.2	13.9 ± 8.4
Deep obstruction	2.8 ± 1.4	28.8 ± 16.1	1.9 ± 1.4	3.7 ± 2.6	1.8 ± 1.6	24.1 ± 16.4

* Volume change during test (DV_E), time interval for one-half-volume refilling ($T_E½$), and rate of arterial blood flow ($\dot{Q}_A$) are measured on tracing.

Rate of volume change ($\dot{Q}_T$) after exercise for interval $T_E½$ is slope of curve over half-time interval. On an XY plot: $DV_E/2 = Y$ and $T_E½ = X$. Since $T_E½$ is in seconds, it must be divided by 60. Slope is,

therefore,

$$Y/X = \dot{Q}_T = \frac{DV_E}{2} / \frac{T_E½}{60}$$

and

$$\dot{Q}_T = 30 \times DV_E/T_E½ \tag{1}$$

$\dot{Q}_T$ is also the sum of two factors: rate of venous regurgitation into the foot ($\dot{Q}_R$) and rate of arterial blood flow into foot ($\dot{Q}_A$). All are in ml/100 ml foot volume/min.

Since

$$\dot{Q}_T = \dot{Q}_R + \dot{Q}_A$$

therefore,

$$\dot{Q}_R = \dot{Q}_T - \dot{Q}_A \tag{2}$$

A correction for $T_E½$ to eliminate effect of a variable $\dot{Q}_A$ is best made by selecting a fixed blood flow to correct to. Zero is not a satisfactory value because if there is no regurgitation (i.e., $\dot{Q}_R = 0$), $T_E½$ becomes infinite. Correcting to nearest whole value of mean $\dot{Q}_A$ of controls is convenient. Where $T_E½C$ is the corrected value,

$$\text{slope} = \dot{Q}_R + 2 = 30 \times DV_E/T_E½C$$

Therefore,

$$30 \times DV_E = T_E½C \times (\dot{Q}_R + 2)$$

and since

$$30 \times DV_E = T_E½ \times \dot{Q}_T \quad \text{from (1)}$$

therefore,

$$T_E½C = T_E½ \times \dot{Q}_T/(\dot{Q}_R + 2) \tag{3}$$

† DV and $T½$ are measured on strip chart tracing made after elevation. $\dot{Q}_A$ is recorded. $\dot{Q}_T$, $\dot{Q}_R$, and $T½$ are calculated as in exercise test but using measured Trendelenburg values.

‡ Per 100 ml foot volume.

Patient 5 had severe greater-saphenous disease and was believed to have secondary calf perforator insufficiency. Following greater-saphenous ligation and stripping, data corrected for blood flow indicated no evidence of regurgitation. The patient was not subjected to further surgery.

Discussion

Foot veins have been used for more than four decades to obtain venous pressures during exercise (11, 12). Foot pressure studies have been considered the "gold standard" to which new noninvasive tests have generally been compared (1, 6, 8, 9). Initially, this was why we chose the foot as the site of venous volume measurement.

We have persisted in using the foot for the following reasons:

1. The most severe venous changes, and often the largest perforating veins, occur in the lower calf, and it is desirable to study the effect of tourniquets placed below the lowest perforators (that is, applied at the ankle level).
2. Because the ratio of muscle to other soft tissue is low in the foot compared to the calf, foot volume measurements are affected much less by the transient increases in blood flow that occur with the exercise test.

TABLE 3

Arterial Blood Flow Foot (ml per 100 ml foot volume)

Category	Mean ± SD*	Range
Control	2.0 ± 1.4	0.5–7.7 (male) 0.3–4.6 (female)
Varicose veins	2.6 ± 2.3	0.5–9.5
Poor calf pump	1.5 ± 0.7	0.3–3.2
Calf perforator insufficiency	2.8 ± 1.7	0.5–6.3
Deep insufficiency	3.9 ± 1.9	0.3–6.0
Deep obstruction	1.7 ± 1.2	0.3–4.5

* During exercise tests.

TABLE 4
Examples of the Effect of Correcting Data

Patient	Exercise vol. (% elevation vol.)	Time ½ vol. refilling (sec)	(corected)	Arterial foot flow (ml/min*)	Rate vol. change (ml/min*)	Rate regurgitation (ml/min*)
1. Control: 50-yr-old						
11/83	90	20	54	5.4	5.4	0.0
3/84	72	47	49	2.1	2.3	0.2
2. Control:						
pregnant	42	15	14	1.9	2.2	0.3
postpartum	23	6	11	3.7	3.7	0.0
3. Deep venous insuff.						
right	31	7	16	4.7	4.7	0.0
left	31	3	8	9.0	11.0	2.0
4. Ligation, left iliac vein						
5/84	34	12	13	2.2	2.9	0.6
9/84	47	6	11	6.6	10.5	3.9
5. Greater saphenous disease						
preop.	31	3	3	1.3	12.2	10.9
postop.	54	14	22	3.6	4.6	1.0

* Per 100 ml foot volume.

Venous foot volume refilling after exercise or elevation is the combined sum of the arterial foot flow and any venous regurgitation. It is evident that regurgitation cannot be quantified by the usual volume tests unless the arterial flow is measured and subtracted from the total rate of volume change. Furthermore, even a meaningful estimate of regurgitation is possible in volume tests only when the arterial flow is relatively small or almost constant. The magnitude of arterial flow in the foot is the result not only of exercise, but also of temperature and other factors. In our series, arterial foot blood flow accounted for about half the refilling and was quite variable, the range of blood flow being more than 1 to 10 in each of our groups. Because of this wide variation, in both normal subjects and patients with venous disease, it is often not possible to make a meaningful estimate of the magnitude of venous regurgitation unless the venous volume filling data are corrected for the arterial flow into the foot.

One might suppose that data obtained by others from the calf are inherently more reliable in estimating regurgitation than foot volume data because the arterial blood flow in the calf is less affected by temperature. This is perhaps true when only passive exercise is used, but such tests do not provide data on the efficacy of the calf muscle pump, and because the venous system is not stressed, significant regurgitation may be missed. Our limited experience is that calf blood flow accounts for a large, quite variable portion of the venous refilling curve after exercise. In a competent calf volume study in control subjects, Barendsen and van den Berg in 1984 concluded (13): "Because any form of exercise of the calf muscles induces a variable amount of exercise hyperemia, the refill time after exercise is not a suitable parameter to assess the competence of the venous valves." We believe, therefore, that the measurement of calf arterial blood flow and correction of calf volume data for this measured blood flow will be found to be important.

The efficacy of the muscle pump is most readily estimated by comparing the volume moved on exercise with the volume moved on elevation. Our normal exercise control range for the foot is 42%–94% of the elevation volume. When it is less than the low value of this range, and regurgitation is small in amount or absent, there is evidence of a poor muscle pump. This may be a simply correctable matter of poor effort by the subject, the result of a variety of factors, such as pain limiting ankle motion, or muscular wasting secondary to disease or disuse. We think this is an important heterogeneous group that deserves more attention. Volume studies using passive exercise techniques do not provide data on this group.

Data examples are given to illustrate how errors in the interpretation of foot volume tests may be resolved by measuring and correcting for blood flow. It is of considerable value simply to correct the time of half-volume repletion to an average mean arterial foot blood flow. Additional information is obtained, however, if the total rate of venous refilling is calculated and the measured rate of arterial inflow is subtracted. When foot blood flow is fully considered in this manner, the factor of venous regurgitation emerges as a quantifiable parameter.

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Quantitative Computerized Joint Scanning in Rheumatoid Arthritis: An Accurate Reproducible Method of Quantitating Synovitis—Preliminary Report

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Abstract

Clinical trials in rheumatoid arthritis have been hampered by the highly subjective nature of disease assessment measures and lack of a consistently reliable laboratory test to follow. The authors devised a method of quantitating synovitis by computerized joint scanning and compared it with six conventional parameters in 18 patients entered into two treatment protocols and a control group.

The results indicate that quantitative joint scanning probably is at least as reliable as the conventional measures and has the advantage of having no placebo or subjective component.

Rheumatoid arthritis (RA) is an autoimmune inflammatory disorder of joints that afflicts seven million Americans (1). Despite its prevalence, mostly subjective measurements have been employed to evaluate disease activity with therapy. The problems in standardizing tests, such as Ritchie index (2), grip strength, 50-ft walking time, and morning stiffness, and the lack of any one consistent laboratory determination to assess activity, have made it difficult to perform well-designed treatment protocols (3). Further, the degree of volunteer effort exerted by patients in various studies may vary widely. Beginning in 1979, we conducted work on the quantitation of synovitis in a reproducible, accurate way in order to evaluate the efficacy of lymphoplasmapheresis (4). In 1981, the authors conducted and published an extensive literature review of joint scanning in RA (5). Our nuclear medicine and rheumatology divisions have collaborated in an effort to quantitate synovitis of the hands, using a method derived from the authors' earlier work and the work of others. This preliminary report describes our studies in 18 patients utilizing quantitative joint scanning of the hands and wrists, and points out the need for further study.

Methods

Eighteen patients who met the American Rheumatological Association criteria for RA were studied (1). All had active hand synovitis and functional class II or III disease (1). The patients were divided into three groups: (A) lymphoplasmapheresis, (B) control, and (C) naproxen.

Group A consisted of 7 patients who underwent a 40 ml/kg plasma exchange with albumin

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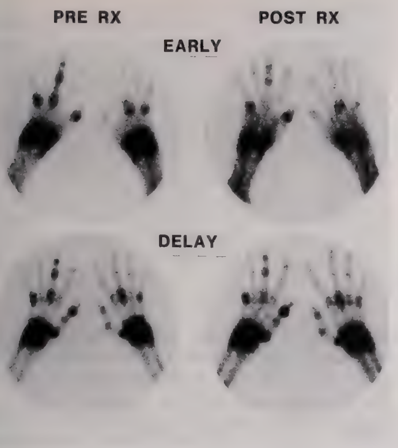

Fig. 1. Patient 5 shows increased activity in several joints following treatment. Improvement is easier to appreciate on early views compared to 3-hr delayed views. All measured joints in this case improved (Table 1).

replacement and a 5 × 10^9 lymphocyte depletion nine times over three weeks. All were taking salicylates or nonsteroidals, less than 10 mg/day of prednisone equivalent, and a disease-modifying drug (3 gold, 3 *d*-penicillamine, 1 azathioprine). They had been receiving the same doses for 3 months prior to study entry, and the doses of these agents were not altered.

Group B included 5 patients who met the criteria for the above apheresis study, and who had been given the same dose of salicylates, nonsteroidals, less than 10 mg of prednisone, and disease-modifying drugs (1 gold, 2 *d*-penicillamine, 1 azathiaprine, 1 none) for three months prior to study entry. Despite the therapy, active synovitis was present. Nevertheless, dosages of the drugs were kept constant for the study period.

Group C consisted of 6 consecutive RA patients seen in the Cedars–Sinai Arthritis Clinic with active synovitis who had been off all RA medications for one week and remittive drugs for three months. They were started on a regimen of naproxen, 500 mg orally twice daily, alone for a three-week period after the first scan was obtained.

The following evaluations were conducted at the time of both scans: Ritchie index, 50-ft walking time (sec), grip strength (mm Hg), morning stiffness (min), self-assessment (scale 1–10), and Westergren sedimentation rate.

The patients received an intravenous injection of 10 mCi of Tc-99m MDP, and early blood pool images of both hands and wrists were obtained during the first 20 min following injection. Data acquisition was begun exactly 2 min after injection. Analog images were obtained for 150,000 counts, and computer acquisition was 6 min/view. After the first view of the hands and wrists, a view of the forearm was obtained as a control area. A repeat view of the hands and wrists was then taken.

The second scinitigram was repeated three weeks after the first. A conscious effort was made to minimize physical and technical variables (patient positioning, time of day, room temperature, prior administration of antiinflammatory medication, physical activity prior to scanning, and isotope dose) that could affect scan outcome.

A paper tracing of the patient's hands was made at the time of the first scan. This tracing was used to position the hands in exactly the same way on the postreatment study. The two scans were processed at the same time, and the same size areas of interest were used.

In 6 of the patients, 3-hr delayed Tc-99m MDP images were also obtained. Four other patients had gallium images at 48 or 72 hr. Four patients had technetium pertechnetate scanning performed on the day before the Tc-99m MDP scans.

Abnormal joints in the hands and wrists were selected for quantitation (Fig. 1, Table 1). Regions of interest were drawn over abnormal joints, and counts were measured. The number of counts per area was compared on the two scans. Counts were adjusted, using a forearm control area to correct for small variations in dose or timing (Fig. 2). It was assumed that counts in the control area should not change. Therefore, the joint counts were multiplied by the ratio of control area counts on the two scans to normalize counts in all measured areas.

The posttreatment corrected counts were expressed as a percentage of the pretreatment value. A difference of −10% to +10% was considered no change. Any change of 10% or greater was interpreted as either an improving or worsening response.

Results

The mean ages of the groups at the time of study were (A) 47 (range 30–60), (B) 49 (range

TABLE 1
An Example of Raw Counts Obtained in Patient 5

Early blood pool	Pre-RX	Post-RX	Corrected counts	Uncorrected (%)	Corrected (%)
R wrist	1072	608	638	57	60
R 5th MCP	770	388	407	50	53
R 3rd MCP	701	233	245	33	35
R 2nd PIP	537	228	239	42	45
L wrist	1092	498	523	46	48
L 2nd MCP	636	269	282	42	44
L 5th MCP	569	219	230	38	40
Forearm control	389	371	390	95	100.2

Correction factor = 1.05.

31–65), (C) 53 (range 29–65). All 7 patients in group A, 4 of 5 patients in group B, and 5 of 6 patients in group C were women. The mean duration of disease was 11, 8, and 6 years, respectively.

The apheresis group had an overall 22.3% decrease in uptake, the naproxen group 10.9%, and the control group a 25.9% increase in uptake (Tables 1, 2).

The observations made using accepted methods of clinical testing were compared with the scan findings (Table 3). Using a change of 10% or more in the scan as "significant," 5 of the 7 A, none of the 5 B, and 4 of the 6 C patients improved. Two A, 1 B, and 2 C group patients had no change, and 4 of the 5 B patients worsened. In the 9 patients "improved" on joint scan, most clinical measurements also improved. The 5 patients whose scan did not change had slightly more favorable clinical measurements. On the other hands, the worsening noted on scan in 4 patients could not have been predicted by routine clinical measurements, which tended to favor no change. In a tabulation of the instances in which a given measure agreed with the scan finding (improved, no change, worsening), all measures except 50-ft walking time agreed with the scan result at least half the time, but none more than 64% of the time (Table 4). Despite this, a composite averaging of the six tests showed much greater agreement with the scan result. This average agreed with the scan finding 67% of the time: in 8 of 9 who improved, 3 of 5 who had no change, and 1 of 4 whose scan showed worsening. These findings point to a serious weakness in subjective testing (Table 4).

In general, the number of joints showing abnormality was quite variable. Joints that appear

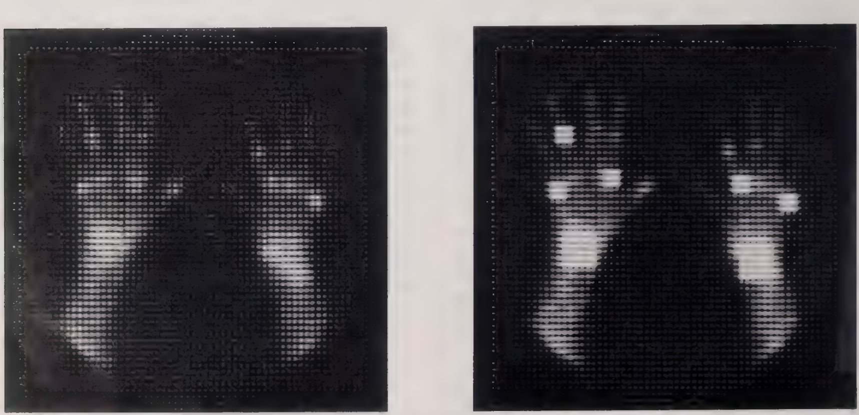

Fig. 2. Example of regions of interest placed over inflamed joints. Amount of counts within each region was quantitated.

TABLE 2

Radionuclide Uptake following Treatment Expressed as a Percentage of Uptake before Treatment

Group	L wrist	R wrist	L MCP	R MCP	R PIP	Mean (%)
Apheresis						
1	89	119	73	50	108	87.8
2	69	61	43	75	49	59.4
3	99	114	90	116	99	103.6
4	80	75	77	73	74	75.8
5	48	60	42	44	45	47.8
6	—	97	93	93	83	73.0
7	81	108	—	107	84	95.0
Mean	78.8%	90.6%	69.5%	79.7%	77.4%	77.5%
Control						
8	121	114	100	120	114	113.8
9	85	89	102	93	110	95.8
10	108	162	107	123	—	125.0
11	147	163	115	155	—	145.0
12	110	109	122	170	208	149.8
Mean	114.2%	127.4%	109.2%	132.2%	144%	125.8
Naproxen						
13	84	97	—	—	92	91.0
14	80	101	92	71	—	86.0
15	110	95	—	110	—	105.0
16	76	85	—	76	65	75.5
17	70	76	—	89	124	89.8
18	—	130	59	—	72	87.0
Mean	84%	97.3%	75.5%	85.5%	88.5%	89.1

—, no uptake in that area.

normal are unlikely to demonstrate improvement.

Discussion

In view of the inadequate set of measures currently used to assess the activity of RA and synovitis in particular, studies by which the efficacy of a treatment modality is evaluated are often open to question. The largely subjective nature of these evaluations and subjective influences on patients and on examiners denote a substantial placebo component that needs to be considered.

The authors have devised a method of quantitating synovitis and compared it with conventional measures in 18 patients undergoing three different treatment protocols. Control patients, who did not have their treatment regimen altered, when reexamined and scanned three weeks later demonstrated improvement in none of five scans, but in most of these patients Ritchie index, 50-ft walking time, grip strength, and morning stiffness improved. This suggests either efforts to please the examiner or improvement by learning from repeated effort. Westergren sedimentation rates and self-assessment did not change. In the second group, treatment with a nonsteroidal antiinflammatory (NSAID) agent of known modest-to-moderate effectiveness in RA, naproxen, resulted in improved scans in 4 of 6 patients and no change in 2. The other indices bore out this impression, but to a more favorable extent. The third group demonstrated that lymphoplasmapheresis decreases synovitis to a greater extent than naproxen and that most of the conventional indices also improved. Using a single parameter (for example, 50-ft walking time) gave a much less precise impression of clinical activity than a composite of all these parameters—and the composite was usually in concurrence with or slightly more favorable than the scan findings. Therefore, quantitative computerized joint scanning appears to be a good index of synovitis that has no subjective component.

Joint scanning was first described by Weiss et al, in 1965 (6). By using albumin labeled with ^{131}I, they were able to crudely localize synovitis. Technetium pertechnetate (TcO^4) was first used in 1967 to scan joints (2), and TcMDP followed in the mid-1970s. Gallium citrate has also been employed. TcO^4 uptake reflects synovial hyperemia, but is also taken up by organic bone matrix and mature collagen. The best uptake times are between 15 and 30 min. However, TcO^4 is not very

TABLE 3

Comparison of Clinical Measures with Scan Findings

Group	Ritchie	Walk	Grip	A.M. stiff	Self	Sed. rate	Scan
Apheresis							
1	+	+	+	+	+	+	+ (88%)
2	+	+	+	+	+	+	+ (59%)
3	+	—	+	0	0	+	0 (104%)
4	0	+	+	+	+	−	+ (76%)
5	+	0	−	+	+	+	+ (49%)
6	+	0	+	+	+	+	+ (73%)
7	+	+	+	+	+	+	+ (95%)
Control							
8	+	+	+	+	+	−	− (114%)
9	0	+	+	+	−	+	0 (96%)
10	+	0	+	−	0	−	− (125%)
11	+	+	—	+	0	0	− (145%)
12	0	—	0	0	0	0	− (144%)
Naproxen							
13	+	+	0	+	−	0	0 (91%)
14	+	+	−	+	+	—	+ (86%)
15	+	+	+	+	0	—	0 (105%)
16	+	+	+	+	+	—	+ (76%)
17	+	0	+	+	+	—	+ (89.8%)
18	—	—	—	—	—	+	+ (87%)

+, Greater than 10% improvement; 0, less than 10% change; −, greater than 10% worsening; —, test not done.

specific and a false-positive uptake of 10%–20% has been observed (8–10). Rosenspire et al (11) demonstrated that in an animal model, pertechnetate uptake in bone accounts for almost 70% of the total joint uptake. TcMDP has a blood pool phase similar to that of TcO^4, with good early uptake and also excellent visualization of joints on the standard 2–3-hr delayed images. TcMDP is also chemiabsorbed onto hydroxyapatite crystals. This results in less variation of activity compared with TcO^4. TcMDP is now preferred over TcO^4 by many authors. Gallium uptake is dependent on cellular activity, but gallium is also to some extent a bone and bone marrow agent. The reader is referred to several good review articles for more information about isotope physiology (12–17).

Nonquantitative joint scanning compared favorably with x ray (18–22), thermography (23), and serial synovial biopsies (24). Since the original attempt by Alcaron-Segovia et al in 1967 to quantitate synovitis (7), at least 10 methods have been utilized (7, 18, 20, 25–31). Four of the most promising, reproducible methods were compared by Rosenspire et al (26). The best correlation was obtained by normalizing counts per unit area for body weight and dose of radiopharmaceutical, but these authors still found considerable overlap between normal and rheumatoid joints.

Our approach was somewhat different. The authors were not trying to diagnose arthritis or distinguish normal from abnormal joints. The authors simply used quantitative scanning to detect changes following therapy. Each patient served as his/her own control. During the first part of the study we did both early blood pool and delayed images on each patient. A few patients also had gallium scans. Unfortunately, spending 3–4 hr in the Nuclear Medicine Department was inconvenient and uncomfortable for many of the patients. They often had to rely on another person to bring them to and from the hospital. Returning on 2 or 3 different days for multiple scans was an even greater hardship. The first 3

TABLE 4

Summary of Concurrence of Testing Measure with Scan Result (Both Improved, Both Unchanged, or Both Worse)

Test	No.	%
Morning stiffness	11/17	64%
Self-assessment	11/17	64%
Ritchie index	9/17	52%
Westergren sedimentation rate	8/14	57%
Grip strength	8/16	50%
50-ft walking time	6/15	40%
Composite average of tests in agreement with scan		
Patients improved on scan	8/9	89%
No change in scan	3/5	60%
Patients worsening on scan	1/4	25%
Overall	12/18	67%

patients who underwent therapeutic apheresis demonstrated quantitative evidence of improvement in 16 of 20 joints on the early views (80%). There was evidence of improvement in only 12 of 20 measured joints (60%) on 3-hr delayed images. These 3 patients were clinically improved (4). The protocol was then shortened by making the delayed views optional as well as eliminating gallium scanning.

Quantitative computerized joint scanning of the sacroiliac joints is of probable benefit in assessing the efficacy of NSAIDS in ankylosing spondylitis (32–35) as early as 3 weeks after the initiation of therapy. It is of questionable value in making a diagnosis of ankylosing spondylitis, but of definite value in quantitating synovitis. In most of the reports cited above, sacroiliac-joint-to-bone uptake ratio is used.

Previous comparative isotope studies in RA suggest that Tc-99m MDP is equal to gallium if sepsis is not present (36, 37) and is superior to TcO_4 (38). The results in 8 of our patients who were also scanned with gallium or TcO_4 appear to confirm the above reports. Too few patients were studied with more than one isotope to make a more meaningful comparison.

In evaluating the efficacy of NSAIDs, four reports found good correlations between joint-scanning techniques and clinical responses (35, 39–41), and four found poor correlations (23, 31, 42, 43). None of the latter studies used Tc-99m MDP. TcO^4 was as good as clinical parameters in a triple crossover sodium salicylate, indomethacin, placebo study (40, 44). In two studies where NSAIDs had poor clinical-versus-scan correlations, good correlation with prednisone was demonstrated (23, 43). As expected, stronger drugs produce more impressive scanning results. For example, gold, *d*-penicillamine and cyclophosphamide were associated with marked decreases in joint uptake (8, 45, 46). We also found more convincing improvement in our patients who underwent more vigorous therapy. The mean posttherapy uptake was 78% of pretreatment levels in the apheresis group, compared to 89% in the group treated with naproxen.

It is noteworthy that 4 of the 5 control patients worsened. Admittedly, this represents an artificial situation, in that all 5 had very active synovitis and their medications were not adjusted as they would usually be by a treating physician.

Owing to the need for more objective methods of evaluating therapeutic response in patients with rheumatoid arthritis, the authors devised simple method for quantitative computerized joint scanning. Our study was limited to the hands and wrists because this is a nearly universal target area in rheumatoid arthritis. Synovitis was quantitated and compared with six conventional assessment parameters. Preliminary evidence suggests that this scanning technique is at least as good as if not superior to, the conventional parameters in evaluating therapeutic response. Further study with larger groupings of patients that can be analyzed statistically is in progress.

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Albendazole in the Conservative Management of Multiple Hydatid Disease

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Abstract

Hydatid disease is quite common in Greece and is routinely treated by surgery. Nevertheless, multiple cysts constitute a difficult problem for treatment. Patients with multiple cysts have already undergone several operations, and their general condition may be poor. We investigated the effect of albendazole [a drug not FDA approved in the US], in the conservative management of multiple hydatid disease in 44 patients with a high antiechinococcal antibody titer who had already undergone two or three operations for the disease (21 men, mean age 51.05; 24 women, mean age 53.42). Albendazole was administered daily in a 10 mg/kg dose for 5 months to 33 patients and for 2 months to 11 patients.

Cysts disappeared in 5 patients and decreased in size in 12 patients. Side effects included allergic shock (1 patient), reversible increase in SGOT and SGPT (3 patients), reversible fever and fall in leukocyte number (1 patient). We conclude that surgery remains the treatment of choice for this condition and that albendazole may have a place in the elimination of recurrence of the disease.

This report concerns the clinical use of albendazole in the conservative management of hydatid disease. We studied the effects of albendazole treatment on a group of 44 patients (20 men, 24 women) operated on twice or three times for hydatid disease. We present the results and side effects of albendazole treatment in the series we studied.

As an adjunctive therapy after surgical treatment, albendazole seems to prevent recurrence, but toxicity after prolonged clinical use should be further evaluated.

Patients and Methods

We studied 44 patients (20 men, mean age 51.05; 24 women, mean age 53.42) with hydatid disease. Our criteria for selection of patients were (a) positive serological tests; (b) location of cysts in liver or in liver and other organs; (c) counterindication for surgical treatment due to multiple previous operations; and (d) CT or ultrasound monitoring of cysts available.

We excluded some patients from our study, using these criteria: (a) Antihelminthic drug treatment during the last 15 days; (b) bad general condition; (c) receiving medical treatment for other conditions; (d) impaired liver, kidney, or cardiac function; (e) pregnancy; (f) history of epilepsy; (g) hematologic disorders; (h) known hypersensitivity to albendazole.

Albendazole was administered in a daily dose of 10 mg/kg. Duration of treatment was 5 months for the first 3 groups and 2 months for patients of the fourth group. During treatment with albendazole, all patients were monitored as follows: clinical assessment every 15 days; assessment of liver and kidney function every 15 days; blood count every 15 days; antiechinococcal antibody titer before and after treatment; and CT or ultrasound study before and after treatment.

Our patients were divided into four groups by site of cysts and, for the group without clinical disease, by other criteria (Table 1). All patients had a high antiechinococcal antibody titer before treatment. Group A (7 patients) had multifocal cysts of the abdomen. Group B (21 patients) had

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either solitary or multiple cysts in the liver. Group C (5 patients) had multiple cysts in the lungs. All patients in these three groups had already been operated on two or three times for the disease. Group D (11 patients) had been operated on for hydatid disease of the liver, but the antiechinococcal antibody titer remained high (1:32.000).

TABLE 1
Clinical Characteristics of Study Groups

	Group Criteria	No. of pts. (M*/F†)
Group A	Cysts in peritoneal cavity, parenchymal organs	7 (3/4)
Group B	Solitary or multiple cysts of liver	21 (9/12)
Group C	Multiple cysts of lungs	5 (3/12)
Group D	Operated on; high antibody titer and negative ultrasound	11 (5/6)
Total		44 (20/24)

* Mean age 51.05 years.
† Mean age 53.42 years.

TABLE 2
Results in Group A (4 Women, 2 Men), Multifocal Hydatid Disease of Abdomen

Response to Rx	No. of pts (%)
Complete cure	0 (0)
Disappearace of small and decrease in size of large cysts	4 (57.14)
Slight decrease in cyst size	2 (28.57)
No response	1 (14.28)
Total	7 (100)

Duration of treatment: 5 months; dose: 10 mg/kg each 24 hr.

TABLE 3
Results in Group B (12 Women, 9 Men)

Response to Rx	No. of pts (%)
Complete cure	5 (23.80)
Decrease in cyst size	12 (57.14)
None	4 (19.04)
Total	21 (100)

TABLE 4
Results in Group C (2 Women, 3 Men), Hydatid Disease of Lungs

Complete cure	2 (40)
Rupture to bronchi	1 (20)
Allergic reaction	1 (20)
None	1 (20)
Total	5 (100)

TABLE 5
Adverse Reactions among All Treated Patients

	No. of pts (%)
Allergic shock	1 (2.27)
Liver transaminase rise	3 (6.81)
Leukopenia plus fever	1 (2.27)
Deaths	0 (0)

The criteria for evaluation of treatment were disappearance or decrease in size of cysts (using CT or ultrasound); fall in antiechinococcal antibody titer; decreased eosinophilia; and improvement of general condition of the patient.

Results

After treatment with the drug albendazole we observed the following results: In group A, 4 of the 7 patients with multifocal hydatid disease of the abdomen were significantly improved; the small cysts disappeared and the large cysts decreased in size (Fig.). Two patients had a slight decrease in size of cysts (Table 2).

In 5 of 21 patients in group B, the group with liver lesions, cysts disappeared completely, and in 12 (of 21) patients we observed a decrease in cyst size (Table 3).

In two of the five patients in group C, all with hydatid disease of the lungs, cysts disappeared (Table 4).

In all patients in groups A, B, and C who responded to therapy, we observed a decrease or disappearance of cysts, a fall in antiechinococcal antibody titer to below 1:512, and a fall in eosinophilia 5 months after discontinuing treatment. In patients in group D, although we noticed a limited decrease in titer of antiechinococcal antibody, there were no apparent signs of clinical disease at the end of treatment.

Discussion

Our results are encouraging. The conservative treatment of *Echinococcus* with albendazole is important for those patients whose disease is inoperable because it is widespread or because the patient is in poor general condition.

Penetration of the drug depends on the thickness and calcification of the cyst wall; cysts with thin uncalcified wall respond better to treatment. These variations may be responsible for variations in our results (4).

The side effects of albendazole (Table 5) that occurred in our patients were allergic shock with the first dose (one patient, 2.27%); treatment of this patient was discontinued. Reversible increase of SGOT and SGPT occurred in 3 patients (6.81%), and fever and fall in leukocytes in one patient (2.27%); seven days later this patient recovered spontaneously.

We conclude that the treatment of choice for echinococcosis is surgery. Albendazole has been under clinical research for the last two years for its efficiency in the management of multifocal echinococcosis. The side effects of this drug are minimal and under control. Albendazole may have a place in the treatment of selected patients who meet the criteria for conservative treatment, as a means of eliminating recurrence of the disease.

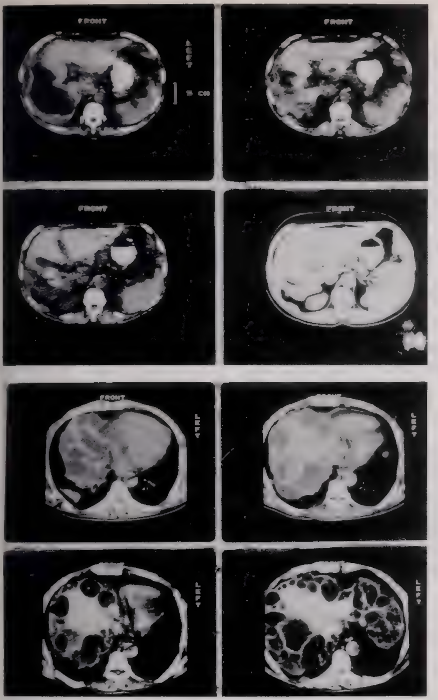

Fig. **Top** CAT scan of patient in group A before treatment. Multiple hydatid disease. **Bottom** CAT scan of same patient two months after albendazole treatment.

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Cerebellar Tumor Causing Hypertensive Crisis and Simulating Pheochromocytoma and Cushing's Syndrome

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Abstract

We describe a case of posterior fossa medulloblastoma in which the initial symptom was severe hypertension that evolved into a hypertensive crisis. Initial diagnostic evaluation was suggestive of both pheochromocytoma and Cushing's syndrome: elevated plasma norepinephrine and urine VMA, normal ACTH level with elevated plasma and urine cortisol, and lack of suppressibility with dexamethasone. CAT scan and cerebral angiogram subsequently revealed the presence of an intracranial mass. After surgical removal of the tumor, blood pressure pattern and endocrine abnormalities reverted to normal.

The association of central nervous system lesions with paroxysmal or sustained hypertension is well established. Mass lesions in the brainstem area, however, have been only sporadically associated with arterial hypertension, despite their strategic location in central inhibitory and excitatory neuronal pathways (1). Only three previous reports have documented the occurrence of a posterior fossa tumor causing hypertension with clinical or endocrine features mimicking pheochromocytoma (2–4). We describe the unique case of a patient with cerebellar medulloblastoma compressing the brainstem and the cerebral ventricles whose initial symptom was severe hypertension that evolved into a hypertensive crisis. Diagnostic features were suggestive of both pheochromocytoma and Cushing's syndrome. These abnormalities resolved after the tumor was treated with surgery and irradiation.

Case Report

A 30-yr-old man was admitted to the medical service for evaluation and control of severe hypertension. Elevated blood pressure had been detected 2 yr earlier on routine examination. Antihypertensive drug therapy was then initiated but was discontinued because of side effects. The patient did not return for subsequent visits. Six weeks prior to admission, he sought medical attention because of a progressively severe frontooccipital headache and several vertigolike dizzy spells. He had not complained of blurred vision, nausea, or loss of consciousness. This was his first hospital admission. He had lost 35 lb over the previous 3 mo while on a low-calorie diet. His mother had been hypertensive since adolescence and his father had died of lung cancer.

Admission examination revealed an overweight, irritable male. Seated blood pressure was 190/135 mm Hg, heart rate 88 beats/min. Red purplish striae were noted on his abdomen, but he had no other features of Cushing's syndrome or other signs of secondary hypertension. Funduscopic examination revealed only grade I hypertensive retinopathy. A neurologic consultant found equivocal signs of cerebellar dysfunction.

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Routine laboratory investigation showed normal renal function, normal urinary sediment, and no plasma electrolyte abnormalities. Electrocardiogram met voltage criteria for left ventricular hypertrophy.

During the first days of hospitalization, blood pressure varied from 140/90 to 190/130 mm Hg, without a clear pattern in relation to attempted control with hydrochlorothiazide, propranolol, and prazosin in varying doses. An extensive evaluation for secondary causes of hypertension was undertaken. Endocrine screening for pheochromocytoma and Cushing's disease was performed.

On the fourth hospital day, the patient became diaphoretic and lethargic. He was transferred to the intensive care unit, where blood pressure was noted to fluctuate between 160/90 and 275/130 mmHg and heart rate between 50 and 100 beats/min. He became transiently stuporous and had a brief episode of Kussmaul respiration, followed by apnea.

Treatment for hypertensive crisis was empirically given with intravenous phentolamine. Blood pressure decreased after the initial injection (5 mg) but subsequently failed to respond to continuous infusion of this agent. Plasma norepinephrine, sampled earlier, was elevated, with a mild increase in VMA, but plasma epinephrine and metanephrine were normal. An abdominal sonogram was suggestive of bilateral adrenal enlargement and a tumor in the left adrenal gland, but abdominal CAT scan failed to confirm this finding. The diagnosis of pheochromocytoma was considered unlikely in view of the lack of continuous response to phentolamine and the negative CAT scan findings. Nitroprusside infusion and sublingual nifedipine were required for pressure reduction. Thereafter, adequate control was achieved with oral nifedipine in combination with a beta blocker and a diuretic. Repeat funduscopic examination at that time was unchanged, there was no deterioration in renal function, and the urine sediment remained unremarkable. A renal scan and digital vascular imaging of the renal arteries were normal. Plasma was sampled peripherally and centrally for renin activity (Table).

Additional diagnostic studies were undertaken because plasma cortisol levels continued to be markedly elevated, while maintaining some diurnal variation (Table). Lack of suppression with 2 mg dexamethasone, at a time when the patient was not receiving any drugs that could interfere with this test, suggested Cushing's disease. ACTH plasma concentration and skull x-rays were normal.

TABLE
Endocrine Studies for Secondary Hypertension

Procedure	Pre-surgery	Post-surgery	Normal values
PRA peripheral	2.1	—	1.5–5.0 ng/mL/hr
Inferior vena cava	3.7	—	
Left renal vein	5.5	—	
Right renal vein	5.0	—	
Plasma aldosterone	19.8	—	<16.0 ng/dL
Plasma epinephrine*	25.0	165	0–55 ng/L
Plasma norepinephrine*	2,078	850	65–320 ng/L
Urine VMA*	5.0	—	<3.5 μg/mg Cr
Urine metanephrine*	0.24	—	<1.5 μg/mg Cr
Plasma cortisol			
A.M.	31	10.5	7–25 μg/dL
P.M.	19	—	2–9 μg/dL
2 mg dst†	38		<5 μg/dL
Urine free cortisol	314	59	20–100 μg/24 hr
2 mg dst†	82		<30 μg/dL
Plasma ACTH	79	—	<80 pg/mL

* Plasma catecholamines, VMA, and metanephrines were collected during the hypertensive crisis.

† dst, 48-hr dexamethasone suppression test.

The patient remained irritable throughout this time and continued to complain of headache disproportionate to the level of arterial pressure. On the eleventh day in hospital, a brain CAT scan revealed an ill-defined enhanced mass within the posterior fossa, with dilatation of the lateral and third ventricles (Fig.). Cerebral angiography indicated an extraaxial mass within the superior portion of the posterior fossa, with signs of upper herniation and downward replacement of the cerebellar tonsils. Examination of the fundi at this stage revealed bilateral papilledema.

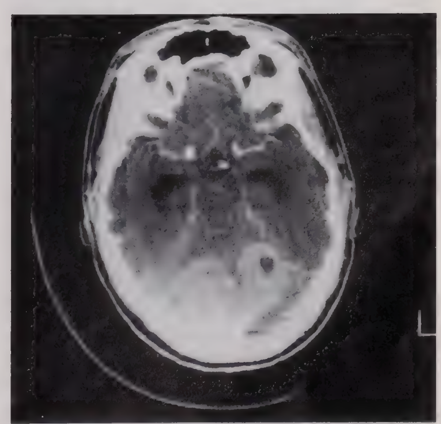

Fig. Brain CAT scan showing ill-defined enhanced mass in posterior fossa with dilatation of lateral and third ventricles.

The posterior fossa mass was surgically resected and pathologic examination revealed a medulloblastoma. The patient's recovery from surgery was uneventful. His headache had completely disappeared. Blood pressure remained at 140–160/90–100 mm Hg during a treatment combination of a vasodilator and a diuretic. Four weeks after surgery, plasma cortisol and urinary free cortisol returned to normal, and plasma norepinephrine concentration had decreased (Table). The patient was given a course of radiotherapy to the posterior fossa and spinal cord.

Discussion

The initial phase of this patient's hospitalization was focused on efforts to control arterial pressure and establish the cause of his disease. Elevation of plasma catecholamine concentration and increased cortisol level suggested both pheochromocytoma and Cushing's syndrome. An ACTH-secreting pheochromocytoma could have explained these abnormalities (5, 6). However, the CAT scan and sonograph of the adrenal areas and abdominal structures did not confirm the presence of an intraabdominal or retroperitoneal tumor.

The persisting severe headache and encephalopathic features led to discovery of a cerebellar tumor. Following resection of the cerebellar mass and a course of radiotherapy, the patient's blood pressure became controllable without requiring rehospitalization. In the postoperative period and thereafter, plasma and urinary cortisol levels normalized. Although plasma norepinephrine declined, the mild residual elevation of catecholamine levels was consistent with antihypertensive medications (a diuretic and calcium channel antagonist).

Posterior fossa masses may cause elevation of blood pressure by producing increased intracranial pressure and ischemia of medullary centers (7, 8). Experimentally, compression of the brainstem causes a rise in systemic blood pressure, a phenomenon known as the "Cushing response" (9). This response is due to sympathoadrenal stimulation caused by activation of "pressor" centers and pathways in the medulla oblongata near the floor of the fourth ventricle with involvement of higher structures as a result of obstruction of the fourth ventricle and increased pressure in the upper ventricular system (7, 8). Such a phenomenon may have operated in our patient to increase catecholamine release (2) and thus account for the clinical and biochemical features which suggested pheochromocytoma. The elevated and nonsuppressible cortisol levels, with normal ACTH concentration, could have similarly resulted from increased intracranial pressure (10).

The pathophysiologic sequence that led to this patient's clinical deterioration may have been an increase in tumor size, possibly from hemorrhage or edema, resulting in increased intracranial pressure, a disturbance of brainstem vasomotor regulation, and increased catecholamine and adrenocortical secretions, all causing accelerated hypertension. The abrupt rise in blood pressure led, in turn, to brain hyperperfusion and edema, further increasing intracranial pressure and resulting in encephalopathy (11). This cycle was temporarily interrupted by the effective reduction in blood pressure and permanently abolished by removal of the tumor. The persisting hypertension after treatment may be due to residual structural damage to brainstem areas or to coexistent essential hypertension.

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Sarcoidosis Complicating Primary Sjögren's Syndrome

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Abstract

A 60-year-old woman with a 25-year history of primary Sjögren's syndrome developed early sarcoidosis, with asymptomatic hilar and mediastinal lymphadenopathies and noncaseating granulomas; there was spontaneous remission of the lymphadenopathies in one year. The occurrence of sarcoidosis complicating long-standing primary Sjögren's syndrome has not been previously reported. A possible common immunologic abnormality is postulated.

Sjögren's syndrome is an autoimmune chronic inflammatory disorder characterized by a lymphoplasmacytic infiltrate of the exocrine glands leading to their destruction and dysfunction ("autoimmune exocrinopathy"). The salivary and lacrimal glands are most prominently involved, producing dryness of the mucous membranes, the sicca syndrome. Sjögren's syndrome may appear as a primary process not associated with any other connective-tissue disorder, the primary form, or in the course of another autoimmune disease, the secondary form (see box) (1–5). I report a case of primary Sjögren's syndrome complicated by asymptomatic hilar and mediastinal lymphadenopathies due to sarcoidosis, a most unusual presentation.

Case Report

A 60-year-old white woman schoolteacher was first seen with history of intermittent swelling of the parotid glands and generalized arthralgias for 25 years, and dryness of the mouth, eyes, and vagina for 15 years. Nine years before, the diagnosis of Sjögren's syndrome was made at another institution based on the findings of xerophthalmia with multiple punctate corneal ulcerations, positive Schirmer's test (keratoconjuctivitis sicca), and a lymphocytic infiltrate of the minor salivary glands. She had been treated symptomatically with analgesics and methylcellulose eye drops and recommendation for meticulous oral hygiene. The medical history included radical mastectomy for carcinoma of the left breast 22 years before, and a partial thyroidectomy for a thyroid nodule ten years before.

Examination revealed dryness of conjunctivae and mouth, as well as the scars of the thyroidectomy and the left radical mastectomy, with residual chronic lymphedema of the left upper extremity.

Antinuclear antibody was positive at a titer of 1:320 with a speckled pattern, eythrocyte sedimentation rate was 32 mm, and rheumatoid factor was present at a titer of 1:40. Chest radiography (Fig., left) showed bilateral hilar and mediastinal lymphadenopathies confirmed by computed tomography of the chest; mediastinoscopy showed matted lymph nodes around the innominate artery; a biopsy revealed productive granulomas consistent with sarcoidosis; no organisms were seen with PAS or acid-fast stains. Serum angiotensin-converting enzyme and serum protein electrophoresis were normal; a gallium 67 scan showed no areas of increased radionuclide uptake, and arterial blood gases on room air and pulmonary function tests were within normal limits.

One year later, the patient remained stable with symptomatic treatment only, and a chest

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Sicca Syndrome: Etiology

- **Sjögren's syndrome**
  - Primary
  - Secondary:
    - Rheumatoid arthritis
    - Systemic lupus erythematosus
    - Progressive systemic sclerosis
    - Mixed connective-tissue disorder
    - Polymyositis
    - Primary biliary cirrhosis
    - Vasculitis
    - Thyroiditis
    - Chronic active hepatitis
    - Mixed cryoglobulinemia
    - Hypergammaglobulinemic purpura
    - Graft-versus-host reaction
- **Sarcoidosis**
- **Hemochromatosis**
- **Amyloidosis**
- **Hyperlipoproteinemias**
  - types IV and V
- **Drug-induced:**
  - Anticholinergics
  - Tricyclic antidepressants
  - α2-adrenergic-receptor agonists

radiograph showed resolution of the hilar and mediastinal lymphadenopathies (Fig., right).

Discussion

The sicca syndrome is characterized by the presence of dry mucous membranes, most commonly the mouth (xerostomia) and the eyes (xerophthalmia). It can have many causes (see box). The diagnosis of primary Sjögren's syndrome is based on the presence of the sicca syndrome with a typical lymphoplasmacytic infiltrate in the labial minor salivary glands, in the absence of any other autoimmune disease. In about one fourth of patients with primary Sjögren's syndrome, the lymphoproliferative process extends to extraglandular sites (1–5). The term "pseudolymphoma" describes an aggressive lymphocytic infiltration of organs other than exocrine glands, which remains histologically benign (2). Kassan et al found that the ratio of observed to expected cases of lymphoma in 134 women with Sjögren's syndrome was 44:1; the relative risk of lymphoma for patients with parotid swelling was 67:1 (6).

This case demonstrates the typical longstanding history of primary Sjögren's syndrome starting in a premenopausal woman with intermittent parotid gland swelling and diffuse arthralgias, followed by the sicca syndrome with the characteristic lymphoplasmacytic infiltrate of minor salivary glands in labial biopsy. Twenty-five years after the beginning of her illness she was incidentally noted to have hilar and mediastinal lymphadenopathies, and lymphoma was strongly suspected, based on the reported association. But the biopsy showed noncaseating granulomas; the clinical course towards spontaneous resolution of the lymphadenopathies confirmed the diagnosis of sarcoidosis.

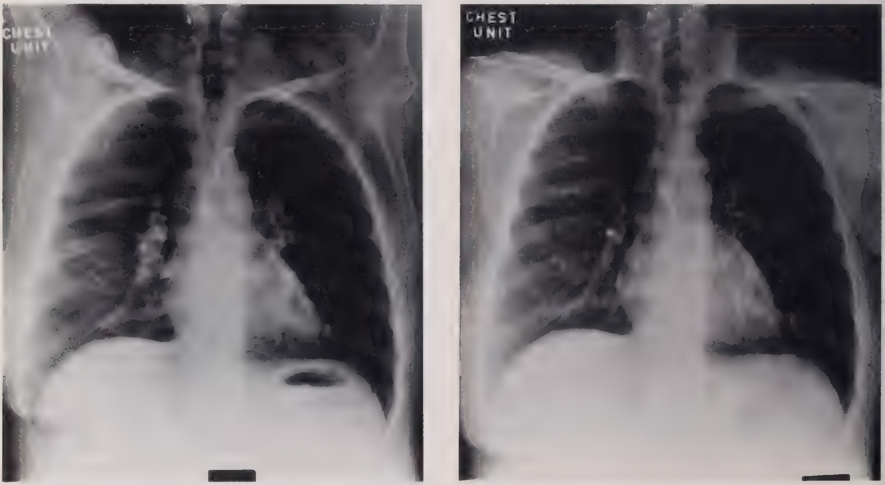

Fig. Chest radiographies showing bilateral hilar and mediastinal lymphadenopathies (**left**), and spontaneous resolution of lymphadenopathies one year later (**right**).

Sarcoidosis is a chronic granulomatous disease of unknown etiology; its clinical manifestations are usually quite different from those of primary or secondary Sjögren's syndrome. But sarcoidosis may affect the lacrimal and salivary glands in 3% and 6% of cases respectively (7), producing the sicca syndrome and salivary gland enlargement, thus resembling the clinical manifestations of Sjögren's syndrome (8, 9). In sarcoidosis, the underlying process is a granulomatous infiltration of the lacrimal and salivary glands; the biopsy of labial minor salivary gland is a highly discriminatory method of distinguishing between sarcoidosis and Sjögren's syndrome (10).

The association of Sjögren's syndrome and sarcoidosis has been previously reported. Fagan et al have described two cases of Sjögren's syndrome overlapping with multiorgan granulomas. One patient had mixed connective-tissue disorder and secondary Sjögren's syndrome with primary biliary cirrhosis and nodular lung lesions containing noncaseating granulomas; the second had Sjögren's syndrome with the typical histologic features on labial biopsy, associated with primary biliary cirrhosis, celiac disease, pulmonary involvement showing noncaseating granulomas, and a positive Kveim-Siltzbach test (11, 12). James and Sharma have reported an "overlap syndrome" in a woman followed up for 25 years, who initially had erythema nodosum and bilateral hilar lymphadenopathy due to sarcoidosis; this subsided, but the patient gradually developed keratoconjunctivitis sicca, xerostomia, parotid gland enlargement, and polyarthritis due to Sjögren's syndrome (7).

Excluding the cases of sicca syndrome due to sarcoidosis with granulomatous infiltration of the lacrimal and salivary glands, mislabeled as Sjögren's syndrome in the literature, the occurrence of early, spontaneously subsiding sarcoidosis complicating long-standing, primary Sjögren's syndrome has not to my knowledge been previously reported.

Salivary gland and transbronchial lung biopsies in primary Sjögren's syndrome have shown predominantly T lymphocytes of the helper/inducer type (13). A subclinical T-cell alveolitis is found in patients with primary Sjögren's syndrome (14). Bronchoalveolar lavage findings in Sjögren's syndrome and in sarcoidosis are strikingly similar, showing an increase in proportion and number of lymphocytes (15, 16). It could be speculated that primary Sjögren's syndrome and sarcoidosis share a common immunologic abnormality and that the association of these two conditions is more than coincidental.

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Liposarcoma of the Ileocecal Valve: A Case Report

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Abstract

Liposarcomas are common soft-tissue neoplasms but are rarely present in the gastrointestinal tract. We report a patient with a primary liposarcoma at the ileocecal valve, a previously unreported location. Wide local excision remains the treatment of choice, but local recurrences are common.

Liposarcomas are uncommon malignant gastrointestinal tumors. We herein describe a patient with a primary liposarcoma at a site previously unreported, the ileocecal valve. Also illustrated by this case is the aggressive nature of the neoplasm in this location, manifested by early recurrence, and the characteristic unresponsiveness to chemotherapy.

Case Report

A 62-yr-old white woman consulted her physician for epigastric pain persistent for five weeks. The medical history was significant for a hysterectomy and bilateral salpingo-oopherectomy followed by pelvic radiation 20 yr previously for endometrial carcinoma and a thymoma 10 yr previously treated by thymectomy. Physical examination disclosed an easily palpable, hard, nontender mass in the right lower quadrant of the abdomen. An upper gastrointestinal examination revealed a large polypoid mass occupying the cecum and proximal ascending colon. This finding was confirmed by barium enema.

At laparotomy a 7.5 × 8.0 × 12 cm multilobulated mass originating from the ileocecal valve was found to occupy the entire cecum and proximal ascending colon. A right hemicolectomy was performed (the surgical specimen is shown in Fig. 1). Microscopic examination confirmed the mass to be a myxoid liposarcoma with infiltration of the wall and secondary serosal lesions (Fig. 2). With the exception of persistent epigastric pain without identifiable source, the patient did well postoperatively.

Three years later, the patient was noted to have a right-lower-quadrant abdominal mass and increasing fatigue. Computerized-tomography (CT) scan revealed right intraabdominal, right retroperitoneal, and right pelvic masses. Needle aspirates confirmed recurrent liposarcoma. The patient underwent a resection of tumor involving the anastomotic site and retroperitoneum. She received three courses of chemotherapy (doxorubicin HCl), but seven months later a CT scan demonstrated new masses in the right lower quadrant, left pelvic, and right paraspinal region. These masses continued to increase in size on CT scan despite additional chemotherapy. The patient died four years and one month after initial diagnosis.

Discussion

Liposarcomas are common soft-tissue neoplasms in adults. Although rare in the gastrointestinal tract, liposarcomas have been reported to occur in the stomach (1), jejunum (2), and retroperitoneum, especially perinephric (3). This case describes a previously unreported primary lesion of the ileocecal valve.

The prognosis in liposarcoma is primarily de-

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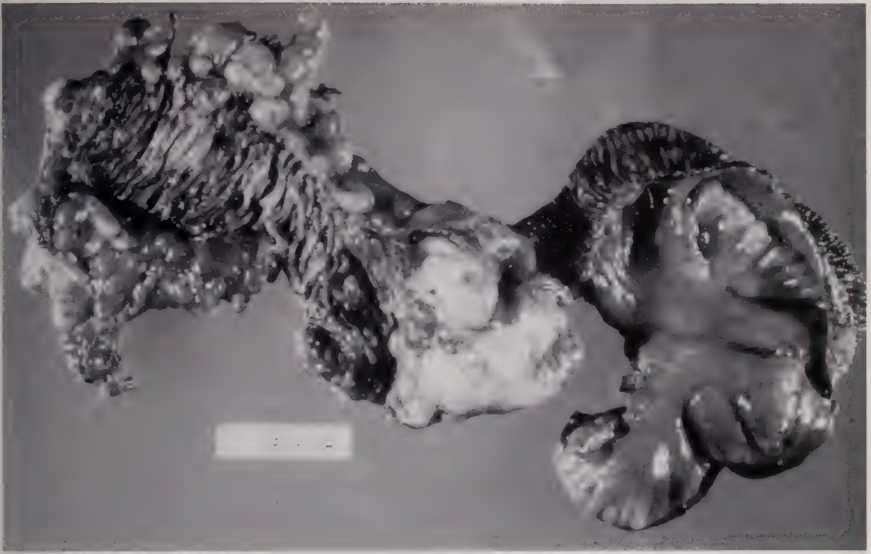

Fig. 1. Surgical specimen with tumor at ileocecal valve.

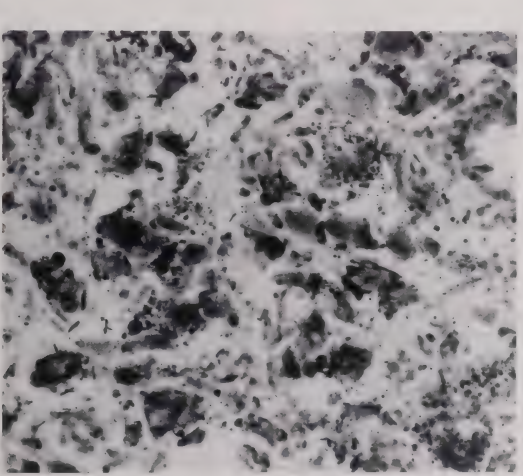

Fig. 2. Microscopic appearance of myxoid liposarcoma.

pendent on the histology and location of the tumor (3, 4). Myxoid and well-differentiated types have the best prognosis; five-year survival rates range between 75% and 100%. A 27% five-year survival rate has been reported for patients with round-cell liposarcoma. No patients with the pleomorphic variety have survived five years. Retroperitoneal liposarcomas are associated with a poor prognosis, only 35% of patients surviving five years. This is probably related to the paucity of symptoms in this location until late in the course of the disease and the inadequacy of surgical resection that can be performed. The recurrence rate after surgical resection is 30% for tumors of the upper extremities and 82% for those of the retroperitoneum.

The role of the patient's previous treatment with radiation for her endometrial carcinoma in the etiology of the liposarcoma is highly speculative at best. Mild radiation changes were found in the ileal segment resected at the time of the hemicolectomy. Although liposarcomas are moderately radiosensitive, it was elected not to give postoperative radiation in this patient. As yet there is no known effective chemotherapeutic treatment for this neoplasm.

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Polyarthritis as the Initial Symptom of Secondary Syphilis: Case Report and Review

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Abstract

The differential diagnosis of the patient with acute polyarthritis is lengthy. We present the case of a young man with acute inflammation of the knees and ankles in whom a diagnosis of acute rheumatic fever was initially considered. The clinical course and laboratory findings suggested that secondary syphilis was also a likely etiology of his problem. We believe that in some patients with acute polyarthritis, secondary syphilis must be seriously considered as part of the differential diagnosis.

Throughout the ages, the diagnosis of syphilis has been a challenge to clinicians. The entity of syphilitic arthritis is now so rare that some have questioned its very existence (1). All too often, in patients whose initial symptom is acute polyarthritis, this diagnosis is rarely considered. Sixty years ago, Todd addressed this issue by saying; "Never diagnose rheumatism in any form until syphilis has been excluded as a possibility in the diagnosis" (2).

When syphilis was more common, bony manifestations of the disease were frequently seen. In 1916, Wile and Senear reported 165 cases of secondary syphilis of which 65 had findings referrable to the musculoskeletal system (3). More recent reports cite an incidence of from 4.2% to 8.1% (4).

Syphilitic arthritis can imitate every form of joint disease (5). It may be monoarticular, polyarticular, or asymmetric. The etiology of the joint pain remains obscure. Both the presence of immune complexes and the invasion of joints by spirochetes have been implicated (6).

The following case report illustrates once again the variety of presentations of *Treponema pallidum* and the difficulty in establishing a definitive diagnosis in a case of acute polyarthritis.

Case Report

An 18-year-old white man was in his normal state of health until seven days prior to admission, when he developed pain and swelling of the right ankle. This subsided after two days, but was soon followed by pain and swelling of both knees. The patient claimed to be sexually active with multiple female partners, denying homosexual relationships. He denied any recent history of fever, sore throat, trauma, recent travel, tickbites, intravenous drug abuse, penile discharge, or dysuria. However, he admitted having had a penile chancre approximately four months earlier for which he did not seek treatment. He had no knowledge of ever having had a heart murmur.

Physical examination revealed a slender young man who appeared his stated age. He was afebrile. Pulse, respiratory rate, and blood pressure were within normal limits. Positive findings included a mild pharyngitis and a short, grade II/VI systolic ejection murmur heard best at the left lower sternal border. Examination of the extremities was notable for the left knee, which was

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warm and tender to touch, with decreased range of motion. Both ankles were warm and slightly swollen, with some tenderness to palpation. Genital examination was unremarkable, with no evidence of skin lesion or penile discharge.

Initial laboratory data included a white blood cell count of 11,400, including 84% segmented neutrophils, 9% lymphocytes, 5% monocytes, 1% eosinophils, and 1% basophils. Erythrocyte sedimentation rate (ESR) was 80. Blood chemistries were normal. Aspiration of the left knee joint yielded serosanguineous fluid with a red blood cell count of 3,000. White blood cell count was 2,250, with 78% segmented neutrophils and 22% lymphocytes. Cultures of blood, urine, and joint fluid were all negative. Gonococcal cultures of penis, pharynx, and rectum were also negative. A routine throat culture was positive for group A beta-hemolytic *Streptococcus*.

Electrocardiogram revealed normal sinus rhythm with a prolonged PR interval of 0.24 sec. Two-dimensional and M-mode echocardiograms and chest x-ray findings were normal. Radiographs of the knees and ankles were remarkable only for soft-tissue swelling of the left knee.

Further blood examination revealed a positive serum streptozyme, an anti-streptolysin O titer of 1,200 Todd units. C-reactive protein was elevated to 6.0 (normal <0.5). Sickledex, rheumatoid factor, and antinuclear antibody tests were negative. Serum IgG was greater than 3,000 mg% with normal IgA and IgM. C_3 and C_4 were normal.

Based on the Jones criteria, our initial diagnosis was acute rheumatic fever. The patient had a positive throat culture plus one major (polyarthritis) manifestation and multiple minor (elevated ESR, CRP, and prolonged PR interval) manifestations of the Jones criteria.

The patient's streptococcal pharyngitis was treated with 1.2 million units intramuscular benzathine penicillin. His initial regimen was salicylate therapy; however, he showed only minor improvement during the next few days. This was surprising, inasmuch as patients with acute rheumatic fever tend to show dramatic improvement of their joint symptoms shortly after beginning aspirin therapy. Reportedly, 90% of patients are markedly improved within two days, and almost 100% within four days, of initiation of salicylate treatment (7–9).

Four days later, initial laboratory results revealed a reactive VDRL with a titer of 1:256. The microhemagglutin in *T. pallidum* was reactive at 1:256 as well.

The patient was then treated with an additional 2.4 million units of benzathine penicillin. Within a few days significant improvement ensued. The patient was discharged, but was lost to follow-up.

Discussion

Secondary syphilis with joint manifestations can take many different initial clinical forms. It may manifest with bone and joint involvement alone or can be accompanied by lymphadenopathy, rash, pyrexia, and other constitutional symptoms. These may precede or follow the onset of articular problems (3–6, 10).

References to syphilitic arthritis were made in the Middle Ages, most notably by Petreus Maetys in 1485 and by Feyrus in 1537. It is also mentioned by a number of writers of the Renaissance period. This knowledge seems to have been lost or forgotten. John Hunter, writing in 1786, seems not to have known about the condition. In 1817, Sir James Russel recognized syphilis as a cause of arthritis. A classical paper was written by Clutton in 1886 (2).

Different authors have given varying descriptions of syphilitic arthritis. Wile and Senear, in 1916, described the ankles as the most frequently affected joints, followed by the metatarsophalangeal joint and then the elbows. The accompanying pain was characterized as anything from dull to exquisite, sharply localized tenderness (3).

In 1932, Kling described syphilitic arthritis as occurring most frequently in children or young adults and manifesting as monoarthritis or with bilateral knee involvement, including pain, muscle spasm, and periarticular thickening (5).

Another description of the initial form of the disease included an influenzalike illness, with headache, sore throat, fever, and aching joint pains. Low-dose penicillin therapy has not achieved effective results (4, 10).

It appears that syphilitic arthritis may take any or all of the initial forms. One author wrote, "No significant features serve to distinguish the arthritis presented by these patients from other types of arthritis of the same degree of severity" (11).

Laboratory studies have been similarly unsatisfactory in attempting to develop a characteristic picture of syphilitic arthritis. Aside from a positive VDRL, little else can be described as being common to all patients. Even positive serologic findings have been questioned in the literature, since a false positive serologic response for syphilis can be obtained if the patient has a rheumatic disease such as systemic lupus erythematosus (4).

The ESR values in this setting have been described as ranging from 20 to 100. Some investigators have reported mild increases in serum IgG and IgM in three patients with secondary syphilitis with synovitis (6). Serum complement, rheumatoid factor, complete blood count, urinalysis, and antinuclear antibody have been either normal or nonreactive in many patients with syphilitic arthritis.

The attempt to find spirochetes in the joint fluid has been, for the most part, unrewarding. In one study of six patients with presumed syphilitic arthritis, no treponemes were found (1). In another report, no definite spirochetes were found by dark-field studies, nor were any immune-complex-like deposits present. However, there was one report of treponemelike bodies being discovered via electron microscopy in the joints of two patients (6).

On radiographic examination, joints affected by syphilitic arthritis have been described as showing soft tissue swelling with no bony abnormalities (2, 6).

One remarkable feature of syphilitic arthritis is its rapid resolution with appropriate antibiotic therapy. This is usually manifested within 1 week. Also of note is the fact that the joint manifestations do not improve with salicylate therapy alone (2, 6).

Summary

The patient with acute polyarthritis always presents a challenge to the clinician. The differential diagnosis includes rheumatic, infectious, metabolic, hematologic, oncologic, and gastrointestinal diseases (12).

Our patient did satisfy the Jones criteria for acute rheumatic fever. Nevertheless, the clinical course was more consistent with syphilitic arthritis. Most patients with acute rheumatic fever tend to experience dramatic improvement in their joint symptoms shortly after the initiation of salicylate therapy (7–9). This was not evident here. Our patient did experience rapid improvement of symptoms with the institution of appropriate antibiotic therapy. The positive VDRL and elevated specific antitreponema antibodies point toward secondary syphilis as the etiology of his joint pain.

The Jones criteria for the diagnosis of acute rheumatic fever are meant as a guide; they are not diagnostic of acute rheumatic fever. Many patients may fulfill the Jones criteria, yet have other diseases (13). We realize that our patient could have had acute rheumatic fever, and that the positive VDRL was an incidental finding. On the other hand, an equally strong argument can be made for secondary syphilis as accounting for this young man's symptoms.

We conclude that no study of the patient with acute polyarthritis is complete until syphilis has been ruled out as a possible etiology.

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Nonsurgical Manangement of an Isolated Interhemispheric Subdural Hematoma Sequentially Followed by CT

JOHN O. LUSINS, M.D., FACP, AND JAMES D. MCCHESNEY, MD.

Abstract

Using transaxial CT scan, we diagnosed a patient with head injury as having an isolated interhemispheric subdural hematoma, on the basis of the widening of the superior sagittal sinus. The diagnosis was confirmed by coronal views. The patient was managed nonsurgically and gradual reabsorption of the hematoma was documented by CT. During the latter stages of reabsorption, two parallel lines were noted on the transaxial views as the subdural collection became smaller and drew away from the sagittal sinus. We conclude that an unusual widening of the superior sagittal sinus on transaxial CT scan warrants suspecting an interhemispheric subdural hematoma. Because the hematoma may be obscured by the overlying clot, coronal views may also be valuable.

A subdural hematoma is a frequently recognized, well described condition often associated with head trauma. They most frequently occur over the cerebral convexities, and at times may be bilateral. The CT appearance of a subdural hematoma has been well documented (1–3). However, an isolated interhemispheric subdural hematoma is rare. We recently had the opportunity to diagnose and to sequentially follow by CT scanning a patient with such a lesion.

Case Report. The patient was a 62-year-old woman with a history of hypertension and no other recent major medical problems. She stated that in February 1986, she sustained a fall on the ice, hitting the back of her head. She lost consciousness at the time of the fall. In the Emergency Room, she was confused and amnesic for the events leading up to as well as after the fall. She was complaining of severe, generalized headache. There was no aphasia. Pupils were equal, round, and bilaterally reactive. Optic discs were flat. Extraocular movements were normal. There were no lateralizing neurologic signs.

A conventional transaxial cerebral CT scan was performed with contrast infusion. The superior sagittal sinus appeared to be widened, as well as irregular in width (Fig. 1); no other abnormalities were noted. Because of this unusual widening, coronal views were performed and an interhemispheric subdural hematoma was diagnosed (Fig. 1). Since the patient was neurologically intact, it was elected to treat her nonsurgically with bedrest and high doses of steroids. The steroids were gradually tapered over two weeks. The patient's mental status improved over the first 48 hours. She nevertheless continued to complain of bilateral headache. The headache, which was managed with analgesics, continued to be a problem for approximately three weeks, although it gradually grew less severe.

A repeat CT scan after two weeks was unchanged. The patient was stable and was released home. Six weeks later a repeat CT scan showed reduction in the size of the hematoma. At this time we also noted two parallel midsagittal lines on the transaxial views. The narrower of the two represented the superior sagittal sinus, and the density to the left represented the remaining subdural fluid, which was gradually

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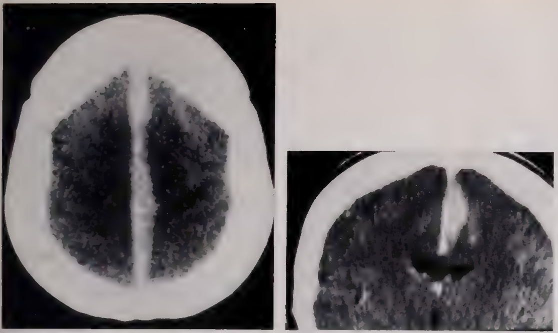

Fig. 1 Left Conventional transaxial enhanced view shows widening of superior sagittal sinus, which is also uneven in width. **Right** Coronal view, performed at same time, demonstrates presence of interhemispheric subdural hematoma.

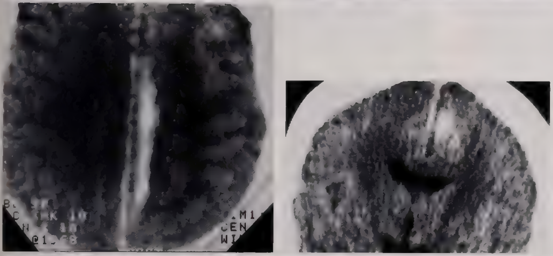

Fig. 2. Left CT two months later, conventional transaxial view: two distinct parallel lines. Thinner line is sagittal sinus, wider line to its left is resolving interhemispheric hematoma. **Right** Coronal view, taken at same time, confirms changes noted on transaxial views.

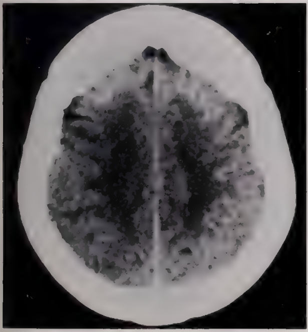

Fig. 3. Repeat scan performed five months after initial scan shows complete reabsorption of interhemispheric subdural hematoma.

being reabsorbed (Fig. 2). Three months later a follow-up CT scan was completely normal (Fig. 3).

Discussion. Nonsurgical management of subdural hematoma was introduced, and subsequently popularized by Bender and his colleagues in the 1960s (4–5). It is now a well-accepted alternative to surgery in stable patients. A number of series have been published describing the work-up, management, and outcome of nonsurgically-treated subdural hematomas (6). In these series, the majority of patients had a successful nonsurgical course, although a small percentage required surgical intervention because of enlargement or nonresolution of the hematoma. The enlargement was thought to occur because of sudden rebleeding into the resolving hematoma (3).

In these series, a wide variety of cases have been described, including patients with bilateral subdural hematoma (7). However, a case of an interhemispheric subdural hematoma treated nonsurgically has not been previously reported. The most likely explanation is that interhemispheric subdural hematomas are rare. In the literature they have been described as most frequently occurring as an extension of a cerebral convexity subdural hematoma, particularly in the frontal area. Prior to CT, and interhemispheric subdural hematoma was verified on angiography by observing that the collosal branches of the anterior cerebral artery were displaced away from the midline (8).

On conventional transaxial CT scan, an interhemispheric subdural hematoma should be suspected if an unusual widening of the superior sagittal sinus is noted. If the interhemispheric hematoma is an extension of a much larger overlying convexity hematoma, the possibility arises that on conventional transaxial CT views, an interhemispheric subdural hematoma could be obscured by the overlying clot. Therefore, in addition to conventional transaxial sections, coronal views may be of value.

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Student Corner

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Orthotopic Liver Transplantation in Children

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Over the past two decades liver transplantation has been studied widely. However, in spite of extensive experimental studies and clinical trials, many still consider it an experimental procedure. Hepatic transplantation, although technically difficult, is less difficult in children than in adults; the first extended survival of liver transplantation was achieved in an 18-month-old child. We reviewed the literature on orthotopic liver transplantation in the pediatric age group.

Many children die each year from liver failure despite good medical management. Liver transplantation is the only option for many of these children. However, many problems exist. Liver procurement is difficult, few surgeons are trained in the technique of liver transplantation, and few centers offer this service. Interestingly, until August 1988 New York City lacked these facilities, and transplant patients had to be referred to centers in other cities. The Mount Sinai Hospital established a liver transplantation unit for pediatric patients in that month, the first hospital in New York City to have a hepatic transplantation center.

Liver transplantation has been studied extensively in the past two decades, clinically as well as experimentally. Two surgical approaches have been used, orthotopic and auxiliary transplantation. Orthotopic liver transplantation, the more common procedure, involves the removal of the host liver and replacement with a homograft. Removal of a diseased liver is usually easier in children than adults (1). Even though orthotopic liver transplantation is technically difficult, it has proven successful in many cases of liver disease in children.

The first attempt to replace a human liver was at the University of Colorado in March 1963. Unfortunately, the patient died, as did four others during the following seven months (2, 3). Other unsuccessful attempts were undertaken in Boston and Paris (4, 5). After a total of seven attempts at the University of Colorado (Table 1), the first extended survival of a human recipient was achieved in July 1967 (6). The patient was an 18-month-old girl who lived for 13 months before dying of metastases from hepatocellular carcinoma. Since then, over 200 patients have had successful liver transplants at the University of Colorado alone, and active clinical transplant programs have been started in many cities (7).

Experimental Background

In spite of extensive experimental studies and clinical trials, liver transplantation is still considered by many to be an experimental procedure. Liver transplantation presents many problems; it is probably the most difficult transplantation to perform. It requires an arterial anastomosis, three venous anastomoses, and a biliary anastomosis.

The first known efforts at experimental orthotopic transplantation were made by Dr. Jack Cannon in 1956 (8). His report was so brief that it lacked a title, description of methods, and notation of animal species. The animals did not survive the transplantation (7, 8). In June 1958, a program of orthotopic transplantation of canine liver was initiated at Peter Bent Brigham Hospital under the direction of Dr. Frances D. Moore, and in August 1958, a similar program was begun at Northwestern University in Chicago (7, 9–11). Rejection in untreated canine liver recip-

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TABLE 1
Results of the First Trials of Orthotopic Liver Transplantations in Denver, Colorado

No.	Age (yr)	Disease	Survival (days)	Primary cause of death
1	3	Extrahepatic biliary atresia	0	Hemorrhage
2	48	Hepatocellular ca, cirrhosis	22	Pulmonary embolism, sepsis
3	68	Duct cell ca	7½	Sepsis, pulmonary emboli, GI bleeding
4	52	Hepatocellular ca, cirrhosis	6½	Pulmonary emboli, ?hepatic failure, pulmonary edema
5	58	Metastatic colon ca	11	Pneumonitis, liver abscesses, hepatic failure
6	29	Hepatocellular ca, cirrhosis	23	Sepsis, bile peritonitis, hepatic failure
7	75	Metastatic colon ca	0	Hemorrhage

Adapted from Starzl TE, Iwatsuki S, et al. Evolution of liver transplantation. Hepatology 1982; 2:614–636.

ients was a problem. Eventually, the use of immunosuppression with azathioprine and antilymphocyte serum or antilymphocyte globulin helped to achieve extended survival in mongrel dogs. In 1965, Garnier in Paris studied orthotopic liver transplantation in pigs and observed that rejection was mild in comparison to dogs (12). Studies on pigs have also been conducted in Bristol (13), Cambridge (14), and Denver (15). Since then, hundreds of experimental studies in various species have been published, many of which have been valuable in the establishment of clinical trials in humans.

Indications for Liver Transplantation

In the two decades since its inception, orthotopic hepatic transplantation has been performed as a curative procedure in patients with a wide spectrum of diseases (Table 2). Hepatic transplantation should be considered for children in whom adequate biliary drainage cannot be surgically achieved. Following a successful portoenterostomy, hepatic transplantation should be considered in children who develop progressive cholestasis, hepatocellular decompensation, and malnutrition.

As mentioned earlier, most of the world's experience with pediatric liver transplantation has been from the University of Colorado (1). The most common indications for transplantation in their practice have been biliary atresia, chronic aggressive hepatitis, and inborn errors of metabolism (1, 6, 16). Each year, children die from liver failure due to the above causes despite good medical management. In fact, the lifespan for infants with uncorrectable biliary atresia is 19 months (17). For all these children, the only chance for survival is liver transplantation.

Biliary atresia is usually either extrahepatic or intrahepatic; however, abnormalities of intrahepatic bile ducts can accompany extrahepatic biliary atresia. In infants with extrahepatic biliary atresia, the liver develops progressive periportal fibrosis, and the liver cords eventually become disrupted by the cirrhotic process. Intrahepatic biliary atresia is rare. The extrahepatic bile ducts are patent, but liver biopsies show progressive disappearance of the intrahepatic portal ducts. Biliary atresia has clinically been associated with trisomy 18, polysplenia, and a preduodenal portal vein; however, it is not considered a true congenital anomaly (17, 18). It is thought to be either acquired after birth (17) or an antenatal process most probably caused by infections with reovirus type 3 (18). The tragic course of victims of biliary atresia requires that liver transplantation be done early in these patients.

Chronic aggressive hepatitis has been another common indicator for liver transplantation. Ideally, the patients should be virus-free. However, some transplant recipients with preexisting Australia antigenemia have had long survivals. Therefore, the presence of virus in these patients is not a contraindication for liver transplantation. These patients can be treated with specific hyperimmune globulin starting on the day of the operation when the titer of the virus is made low by removal of the native liver (16).

Another indication for hepatic transplantation in children is a group of inborn errors of metabolism. Liver-based inborn errors of metabolism are potentially curable with liver transplantation (1, 16). This is also true for some disorders in which the exact enzyme defect is not known. It has been established that the enzyme specificity and protein synthetic phenotypes of liver homografts remain permanently those of the donor (19, 20). Hepatic transplantation has been successful in Wilson's disease (1, 16, 21), which is an autosomal recessive disorder of copper metabolism in which end-organ damage results from excessive accumulation of copper in the liver, central nervous system, kidneys, and other organs. Most patients have reduced or absent serum ceruloplasm. After hepatic transplantation for Wilson's disease, ceruloplasm increases from essentially zero to normal levels and has remained normal for years after the transplantation (16). Other examples of inborn errors of metabolism that have been treated with liver transplantation include alpha$_1$-antitrypsin deficiency, congenital tyrosinemia, type IV glycogen storage disease, Crigler-Najjar syndrome, and protoporphyria (1, 6, 16, 21).

Liver replacement as a means to treat primary hepatic malignancy has not been very successful in children, since recurrence of tumor has been seen in more than 90% of cases. However, it is interesting that two long-term survivors after liver transplantation at the University of Colorado had unsuspected incidental tumors in their livers that were removed because of biliary atresia and alpha$_1$-antitrypsin deficiency, respectively. Both children have remained tumor-free (1).

Organ Procurement and Surgical Technique

Until 1976, methods of preserving the liver limited the acceptable time of cold ischemia (15). Presently, an electrolyte (Collins) solution with a composition similar to that found intracellularly is used for cold infusion of the homograft (22). This method allows for safe preservation for up to 12 hr. The most common reasons for the inability to use a liver are disparity in size between the donor and recipient, the donor is incompatible with the recipient, or facilities for liver recipient care are saturated. Furthermore, a shortage of pediatric donors does exist. Therefore, maintaining the viability of the donor organ is an essential part of liver transplantation. Unfortunately, there is no reliable way at the present time to test for homograft viability.

The following (2, 6, 15) is the method of orthotopic liver transplantation described by Starzl et al, with the modifications introduced by Calne et al. (24, 25). The procedure is easiest in patients with primary hepatic malignancies or primary biliary cirrhosis. It is most difficult in recipients with macronodular cirrhosis or with multiple previous operations. In general, hepatectomy is easier in infants and children than in adolescents and adults.

The operation itself is simple, but the difficulty lies in the debilitation of the recipients and the abnormal vascularization patterns caused by portal hypertension in end-stage liver disease. Most cases of chronic liver disease also involve some defects in clotting (2, 15). Prior surgery may involve adhesions or other alterations which complicate matters further.

TABLE 2

Possible Indications for Hepatic Transplantation in Children

Indication	Reference No.
Biliary atresia (extra- or intrahepatic)	1, 6, 16, 21
Chronic aggressive hepatitis	1, 16, 21
Congenital biliary cirrhosis	21
Wilson's disease	1, 16, 21
Protoporphyria	21
Glycogen storage disease types I and IV	16, 21
Galactosemia	21
Byler's disease	21
Congenital tyrosinemia	21
Crigler-Najjar syndrome	21
Congenital hepatic fibrosis	21
Neonatal hepatitis	21
Sea-blue histiocyte syndrome	21
Hemochromatosis	21
Hepatic vein thrombosis	21
Neoplasia	1, 15, 21
Primary hepatocellular carcinoma	
Cholangiocarcinoma	
Hepatic sarcoma	
Hepatic metastasis	
Amanita poisoning	22

The first step is to find the hilus and dearterialize the liver in order to slow hemorrhage from the liver surface. The portal vein is left intact until later, in order not to aggravate the portal hypertension. The left triangular and falciform ligaments are incised until the suprahepatic vena cava is identified. The suprahepatic vena cava is encircled to allow placement of a cross-clamp. If all of the above is executed successfully, the liver can be isolated from the circulation by cross-clamping vessels which have been encircled but are intact (that is, inferior and suprahepatic vena cava). The technique of isolating the liver and peeling it out in a bloodless state permits all residual tissue connections of the right triangular ligament and the bare areas to be displaced under direct vision. The main disadvantage of this approach is an increase in the time (about 30 min) of portal and vena cava cross-clamping.

The cross-clamping is usually tolerated in patients with chronic disease in spite of the decrease in cardiac output and hypotension (26). In the event of severe hypotension after cross-clamping, Calne et al suggest femoral vein–to–femoral artery bypass with an oxygenator (27).

The physiologic events that contribute to the high perioperative mortality include gross swelling of the intestine during the period of cross-clamping, third-space fluid sequestration, and postoperative renal failure. An earlier method involving venous bypass avoids many of these complications and is therefore still being used (28). Cannulas are placed into the inferior vena cava through an iliac or femoral vein and into the portal system through the open end of the transected portal vein. During the anhepatic phase, the blood is returned to a reservoir and pumped to a large vein in the neck or arm. This kind of bypass requires total-body heparinization.

Until the mid-1970's, biliary tract reconstruction was a difficult procedure. Biliary reconstruction during this period involved a cholecystoduodenostomy. Today the procedure of choice is duct–to–duct anastomosis. If this is not possible, the duct is anastomosed to a Roux limb of jejunum. The homograft gallbladder can be removed or preserved and used as a conduit (28a). Splenectomy is unnecessary and is not recommended since the advent of cyclosporin A (31).

Urgency of liver transplantation in most recipients precludes efforts at tissue matching. Hepatic transplantation has been performed against the recipient antidonor T-warm antibodies, and hyperacute rejection, seen in kidney homografts, has never been seen in the liver (29, 30). Kidney homografts are also hyperacutely rejected if there is incompatibility of blood groups. Liver transplantation is performed despite blood group incompatibility, although the condition is avoided if possible (29).

Further improvement in the success rate of liver transplantation depends a great deal on better means of controlling rejection. Immunosuppressive drug therapy employed in the past was azathioprine and prednisone. A promising new drug, the fungus extract cyclosporin A (31), has been used in a limited clinical trial of kidney homotransplantation in England with good results.

The alternative to hepatic replacement is to leave the diseased liver in place and to transplant an extra liver to an ectopic site such as the splenic bed (32). The major advantage of auxiliary transplantation is that the recipient is not at the outset totally dependent on homograft function. Starzl et al feel that this type of transplantation should be reserved for patients with acute hepatic disease who require life support during which recovery of the diseased liver is possible (29).

Postoperative Complications and Causes of Failure

Evaluation of organ failure is difficult because of the wide variations in operative events, status of the donor organ, and physiologic condition of the recipients.

The main question is whether liver transplants survive better than other transplanted organs do in the face of preexisting immunity to them. The isoimmune reactivity to blood group antigens and preexisting immunity to alloantigens is determined by complement-dependent cytotoxicity toward donor T lymphocytes in recipient serum. As mentioned earlier, blood group compatibility as is practiced for kidney and heart transplantation should be attempted, although successful transplants with incompatible donor livers have been done (29).

Starzl demonstrated that typical cell-mediated rejection is a principal cause of transplant failure at all stages after transplantation (29). The arterial thickening which is seen in kidney and heart transplant rejection is also seen in the liver. Immunosuppressive drug therapy of transplant recipients is necessary in order to control rejection. Cyclosporin A (31) has been used in kidney transplant patients with good results. The drug depresses humoral and cellular immunity with a preferential action against T lymphocytes. Bone marrow depression, which frequently limits the doses of azathioprine and cyclophosphamide, does not accompany use of this drug. The absence of "hyperacute" rejection reactions and the extent to which preexisting immunity in liver transplants can be disregarded remain uncertain. However, unlike kidney transplantation, transplant of liver without prior cross-matching has been done.

Uncontrolled acute rejection is, however, responsible for only 20% of cases that fail. Chronic rejection, which is typified by occlusive arterial disease and parenchymal fibrosis of the homograft, accounts for another small percentage of failure. The main causes of acute mortality include thrombosis of the homograft blood supply, the use of grafts damaged by ischemia, operative hemorrhage, intraoperative cerebal air embolization originating in the homograft, and complications from biliary duct reconstruction.

Besides the usual risk entailed in any surgical procedure, such as infection, technical problems, and risks of anesthesia, hepatic transplantation carries additional surgical pitfalls, of which biliary tract problems are the most important. Choledochocholedochostomy using a T-tube stent is the procedure of choice. It makes postoperative management easier, because if jaundice reappears, T-tube cholangiograms can be done. However, this technique is usually not feasible in children with biliary atresia. In these cases, the alternative techniques performed are cholecystojejunostomy or choledochojejunostomy to a Roux limb of jejunum.

It is difficult to evaluate the influence of the original disease on survival in liver transplant patients because many patients have more than one diagnosis. Nevertheless, special problems can be expected in treating some hepatic diseases. Biliary atresia presents a problem because unexpected anomalies jeopardize performance of the operation. Another important problem is the possibility that immunosuppression may accelerate metastatic tumor growth (33). Studies like Calne's (33) show a low cure rate for patients with duct cell carcinoma and hepatocellular carcinoma and a more favorable prognosis for those with fibrolamellar hepatomas. Multiple earlier operations are also considered a relative contraindication to transplantation (16).

Conclusions

The advances made in the development of liver transplantation, as in renal transplantation, have been attributed to better surgical techniques and better patient selection and management. More questioning of the reasons for post-transplantation liver failure, rather than ascribing the problems to rejection, is needed. Also immunosuppression must be improved comparable to achievements in renal transplantation.

Liver transplantation is extremely expensive, and financing of liver procurement is not on a solid base. In 1982, the approximate range was \$23,000–\$150,000. In some states, Medicaid and Blue Cross/Blue Shield program officials feel that liver transplantation is an experimental procedure and will not fund it. Many recipients have to depend on transplant centers or direct donations from charities to help fund their procedure.

There is a scarcity of surgeons knowledgeable in the technique of liver transplantation. In addition, a limited number of medical centers have liver transplantation units. In New York, for example, no such unit was available until August 1988; before then, children requiring liver transplants had to be referred to centers at New Haven and Pittsburgh.

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Letters

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Diltiazem-Associated Thrombocytopenia: An Opposing Viewpoint

To the editor: Dr. Baggott (1) describes a well documented case of drug-associated immune thrombocytopenia in a 68-year-old man treated with a multidrug regimen for angina. We wish to question the author's conclusion that diltiazem was the most likely cause of the thrombocytopenia. Objective evidence supports diazepam more strongly than diltiazem as the causative agent.

Diazepam antiplatelet antibody levels were both higher and more persistent than those of diltiazem. This was suggested by the positive serum antiplatelet antibody assay positive at both the 1:2 and 1:64 dilutions for diazepam, while diltiazem antibodies were positive only through a 1:4 dilution. Diazepam antibodies persisted at a 1:64 dilution at 5 months; diltiazem's did not.

The author argues that the patient's previously uneventful exposure to diazepam rules it out as a causative agent. Yet earlier he notes in his discussion of Hackett's criterion 1 that "typically the patient [with immune thrombocytopenia] has a history of previous exposure to the drug, although it is possible for immune thrombocytopenia to develop on *prolonged exposure* [emphasis ours] to the drug the first time it is given." The possibility of developing an immunologically mediated thrombocytopenia after prolonged and uneventful exposure to diazepam cannot be discounted, especially in a patient with a history of pronestyl-related lupus. Examples of delayed atopy abound in the literature (2–5). The patient received diltiazem for the first time and for no more than three days prior to the time his platelet counts began to drop, again supporting diazepam as the likelier causative agent.

The history of pronestyl-related lupus also raises the possibility that this case fails to fulfill Hackett's second criterion: the exclusion of other immune causes of thrombocytopenia. Drug-induced lupus has itself been associated with thrombocytopenia (6).

Finally, as Dr. Baggott noted, immune thrombocytopenia due to diazepam has been well documented in the literature (7).

As such, in the absence of rechallenge data, Dr. Baggott's report must be regarded as highly confounded. Thus, there does not yet exist a single unconfounded report of thrombocytopenia due to diltiazem after six years' marketing experience with over 20 million prescriptions in the United States.

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Editor's Note: Dr. Baggott was invited to reply to this letter but declined to do so.

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Correction

"Dysplasia in Dermatology" by John Kwittken, M.D., vol. 55, no. 2 (March 1988): On page 177, the last sentence, next to last paragraph, should read: "It should not be forgotten that malignant melanomas *do* occur in children." On page 188, second column, end of first paragraph headed "Fat Cells," the word before liposarcoma should be "differentiated."

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OLUME 56 NUMBER 2 MARCH 1989

CONTENTS

GENERAL ARTICLES

Pancreatic Duct Occlusion in the Management of Acute Necrotizing Pancreatitis in a Canine Model *Francisco Torino, Octavio Gil, Martin Garaycoechea, Hugo Garcia, Adrian Casavilla, Carlos Shenk, and David Hojman* 79

Activity of $pp60^{c\text{-}scr}$ Protein Kinase in Human Breast Cancer *Steven Lehrer, Joyce O'Shaughnessey, Hee Kyung Song, Eva Levine, Penny Savoretti, Jack Dalton, Roberto Lipsztein, Shalom Kalnicki, and William D. Bloomer* 83

HIV Infection in Transfused Patients with Acute Leukemia *Kevin M. Troy, Janet Cuttner, and James E. Louie* 86

Surgical Alternatives for the Treatment of Nonparasitic Liver Cysts *Thomas M. Boyle and Unsup Kim* 90

Hemodynamic Effects of Verapamil during Fentanyl-Nitrous Oxide Anesthesia *R. M. Griffin, I. Dimich, R. Gurado, Howard Chiang, J. A. Kaplan* 93

Overwhelming Postsplenectomy Infection in Patients with Thalassemia Major *Basil Golematis, Periklis Tzardis, Nikos Legakis, and Polyniki Persidou-Golemati* 97

Alfentanil and Midazolam: New Anesthetic Drugs for Continuous Infusion and an Automated Method of Administration *J. G. Reves, Peter Glass, and James R. Jacobs* 99

CASE REPORTS

Dramatic Response of Pulmonary Metastasis from Prostatic Cancer to LH-RH Agonist Treatment *Jacob Heyman and Elliot Leiter* 108

continued inside

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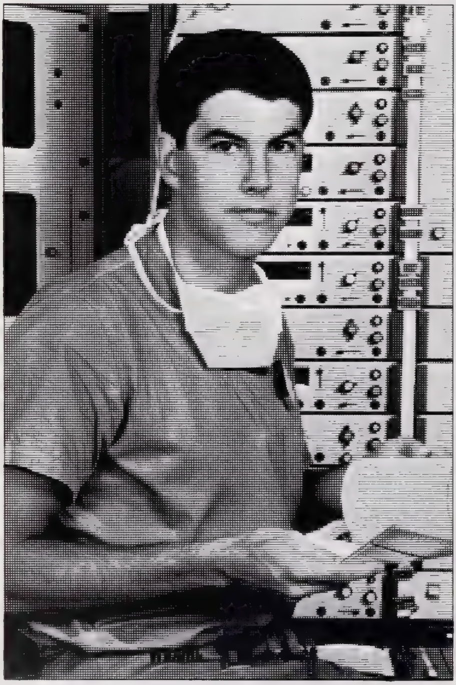

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VOLUME 56
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MARCH 1989

CONTENTS *continued*

Axillary Vein Thrombosis as the Initial Symptom in Metastatic Papillary Carcinoma of the Thyroid *David K. Sirota* 111

Functioning Lipoadenoma of the Parathyroid: Case Report and Literature Review *Ira J. Bleiweiss, Noam Harpaz, James A. Strauchen, Richard Wagner, and Hugh F. Biller* 114

Giant-Cell Neoplasm of the Sphenoid Sinus *Saul Suster, Reuven Porges, Jeffrey Tobias, and Mario Nanes* 118

Malignant Hyperthermia in a Child with Sleep Apnea *Nathan Schwartz and James B. Eisenkraft* 123

Maintenance of Metabolic Alkalosis despite Saline Administration in the Presence of Ascites *Howard B. Weizman and Thomas Kahn* 126

Diffuse Neurofibroma of the Pylorus: A Cause of Gastric Outlet Obstruction *Jenny S. Waxman, Unsup Kim, Antonio M. Subietas, Juan C. Vuletin, and Marian Waxman* 129

Computerized Tomography and Magnetic Resonance Imaging in A Case of Spinal Dysraphism *John O. Lusins, James J. Elting, and Ved Sachdev* 133

PSYCHIATRY NOTES *Kenneth R. Kaufman, editor*

An Overview of Fluoxetine, A New Serotinin-Specific Antidepressant *William F. Boyer and John P. Feighner* 136

REPRODUCTIVE MEDICINE NOTES *Norbert Gleicher, editor*

Assessment of Synthetic Media for In Vitro Fertilization *Richard H. Demir* 141

SURGICAL PATHOLOGY NOTES *Ira S. Schwartz, editor*

Mesothelial Papillary Proliferation of the Pleura Associated with Radiation Therapy: Does It Have a Role in the Pathogenesis of Mesothelioma? *Jaishree Jagirdar, Cheryl Frydman, Hideki Sakurai, and Otilia Dumitrescu* 147

STUDENT CORNER

Aortic Graft-Enteric Fistula and Paraprosthetic-Enteric Fistula: A Review *John R. Wagner* 150

Index to Advertisers

Eli Lilly and Company	cover 3
U.S. Army Recruiting	cover 2

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Pancreatic Duct Occlusion in the Management of Acute Necrotizing Pancreatitis in a Canine Model

FRANCISCO TORINO, M.D., OCTAVIO GIL, M.D., MARTIN GARAYCOECHEA, M.D., HUGO GARCIA, M.D., ADRIAN CASAVILLA, M.D., CARLOS SHENK, V.M.D., AND DAVID HOJMAN, M.D.

Abstract

Based on results reported by others in using prolamine (Ethibloc; Ethicon Gmb H) to treat patients with chronic pancreatitis, without any observed pancreatic complications, we decided to use pancreatic duct occlusion experimentally in dogs in which we induced acute pancreatitis by the injection of calcium chloride into the pancreatic duct. This injection proved to be 100% lethal in the 5 animals constituting the control group, none of which were treated after the injection.

Acute pancreatitis was then induced in 57 animals, also by injection of calcium chloride. These dogs were then treated with one of three substances that share the same physical properties: prolamine; Tissucol (Immuno AG, Vienna), a biologic tissue adhesive; silicone (Xantopren, Bayer Dental D-5090 Leverkusen). Thirty-seven dogs were treated with prolamine, 10 dogs with Tissucol, and 10 with silicone.

The mortality rate in the 57 treated animals was 12.2%, compared to the 100% rate in the untreated control group. The mechanical action achieved by blocking the pancreatic duct shows how the evolution of acute pancreatitis at different stages could be modified. This specific treatment limits the pathophysiologic process of acute pancreatitis in dogs. These findings provide us with a promising outlook for the treatment of this severe illness.

Acute pancreatitis is an illness whose clinical evolution is still unpredictable, and in its most severe forms continues to entail a high mortality rate. Largely, this is due to lack of knowledge about its complex pathophysiology, therefore impeding the use of appropriate therapeutic measures.

Until now, treatment of this illness has been limited to its symptoms. In spite of observed progress in research on this complicated illness, a way to limit or interrupt its various stages has not been found.

The possibility of finding a specific treatment that would act directly on the gland provides great incentive for research. Pancreatic duct occlusion, discussed here, was tested in dogs and proved to have satisfactory results that suggest occlusion may be the right method for obtaining appropriate therapeutic measures.

Materials and Methods

Sixty-two healthy mongrel dogs, both male and female, weighing between 14 kg and 17 kg, were studied. Baseline levels of blood sugar, electrolytes, creatinine, and amylase were obtained before surgery. The study was carried out in three phases, as follows:

Phase I. Five animals made up the control group. The objective was to demonstrate how much time calcium chloride injected into the pancreatic duct takes to provoke the necrotizing stage of the illness and to prove that its mortality rate is 100%.

From the Department of Experimental Surgery, Churruca Hospital, Buenos Aires, and the Department of Experimental Surgery, Italian Hospital, Cordoba, Argentina. Address reprint requests to Francisco Torino, M.D., Azcuenaga 1757 CP 1128, Capital Federal, Argentina.

The dogs were anesthetized, a midline laparotomy was performed, and the main pancreatic duct was isolated in the vicinity of the duodenum. A 20-gauge polyethylene catheter was inserted and introduced for 1 in. into the pancreatic duct, confirmed by careful palpation. After aspiration of pancreatic juice, 5 ml of calcium chloride at 20% concentration was injected in situ.

Phase II. Acute necrotizing pancreatitis was induced in 37 dogs as described above and then at different times, 6 ml of prolamine (Ethibloc; Ethicon Gmb H) was injected under low pressure into the pancreatic duct as follows:

Group a: 20 min after induction of pancreatitis ($n = 12$)
Group b: 6 hr after induction of pancreatitis ($n = 15$)
Group c: 12 hr after induction of pancreatitis ($n = 10$)

The pancreatic duct was then closed with interrupted 6-0 prolene, and the abdomen was closed in layers.

Phase III. Twenty minutes after injection of calcium chloride, either Tissucol (Immuno AG, Vienna), a biological tissue adhesive, or silicone (Xantopren, Bayer Dental D-5090 Leverkusen) was injected into the pancreatic duct as follows:

Group d: 6 ml of Tissucol was administered to each dog ($n = 10$)
Group e: 6 ml of silicone was administered to each dog ($n = 10$)

The pancreatic duct was closed as described above. Water was allowed on the first 2 days following surgery and a soft diet on the third postoperative day. By the end of the first week, all dogs had started back on their mixed diet. Blood samples were taken on the first postoperative day, twice a week thereafter for 2 wk, and then weekly, for biochemical estimation. The dogs were weighed once a week.

All dogs were subjected to full postmortem examination and organs were removed for histologic studies.

Results

Phase I (Control Group). All 5 of the animals in the control group died within 48 hr. Severe ischemic paleness appeared immediately after the administration of the calcium chloride, followed by progressive states of acute pancreatitis, as proved by histologic signs of hemorrhage and necrosis 20 min after the onset of the illness. Necropsy revealed that death was undoubtedly due to the extensive damage to the pancreas.

Phase II (Prolamine). In group a, 2/12 dogs (16.6%) died, one on the first postoperative day from cardiorespiratory causes and the other on the fourth postoperative day from bronchopneumonia.

In group b, 2/15 animals (13.3%) died, on the sixth and forty-eighth postoperative days, from evisceration and bronchopneumonia, respectively.

Only 1/10 dogs (10%) in group c died, on the eighteenth postoperative day, from a severe bronchopneumonic process.

No difference was found between injecting the prolamine 20 min, 6 hr or 12 hr after the acute pancreatitis was induced.

Phase III (Tissucol and Silicone). In the group treated with Tissucol, 1/10 dogs (10%) died, on the ninth postoperative day, from peritonitis secondary to a pancreatic abscess.

One death (10%) from cardiorespiratory causes occurred in the group treated with silicone.

Biochemical Results. Similar developments were observed in all of the surviving dogs. No significant changes in serum electrolytes, creatinine, or bilirubin were noted. Amylase and serum alkaline phosphatase increased up to 10 times the normal value on the first postoperative day and started to decrease at the end of the first week, returning to preoperative levels by the third week. Mild hypoglycemia during the first 24 hr was noted.

Nutritional Condition. The condition of all dogs was satisfactory, but some weight loss was observed in the group treated with silicone. Stools which were soft at first normalized on the tenth postoperative day.

Macroscopic Findings. In all dogs pancreatic atrophy was observed; this atrophy was less evident in those treated with Tissucol. By the third month the gland was almost replaced by fibrous tissue. Upon section, the parenchyma was sclerosed, and in group d retractile ramified silicone was discernible throughout the whole organ.

Microscopic Findings. The exocrine acini were replaced largely by fibrous tissue. The endocrine islets were easily identified and could be seen surrounded by sclerosis.

Discussion

The use of prolamine (Ethibloc) in treating experimental acute pancreatitis was based on previous studies in Germany and Holland (1–4).

TABLE 1
Mortality Rates in Dogs after the Induction of Acute Necrotizing Pancreatitis

Study group	No. of dogs	No. of deaths (postop. day)	Mortality rate
Phase I			
(control)	5	5 (1, 2, 2, 1, 1)	100%
Phase II			
(prolamine)	37	5	13.5%
a: 20 min	12	2 (1, 4)	16.6%
b: 6 hr	15	2 (6, 48)	13.3%
c: 12 hr	10	1 (18)	10.0%
Phase III	20	2	10.0%
d (Tissucol): 20 min	10	1 (9)	10.0%
e (silicone): 20 min	10	1 (1)	10.0%

This substance was injected into the pancreatic duct of patients who had developed chronic pancreatitis. The fact that no pancreatic complications were observed, even though the pancreatic duct was obstructed, led us to propose this project.

We selected calcium chloride as the causal agent of acute pancreatitis because of its 100% mortality rate within 48 hr after administration. This property was confirmed in the results for our control group and enabled the second phase of the experiment to be planned. Prolamine (Ethibloc) is an amino acidic alcohol which hardens quickly in a moist environment and is reabsorbed within 15 days.

Prolamine given 20 min after induction of pancreatitis reduced the mortality to 16.6% (5–7). To assess the ability of ductal blockage to prevent more advanced stages of the illness, the pancreatitis was allowed to advance for 6 and 12 hr, respectively, after which the substance under study was administered (8, 9). The results obtained from these two groups were comparable to those of the initial group, mortality rates being 13.3% for the 6-hr group and 10% for the 12-hr group.

These findings implied that further research was necessary to determine whether the positive results noted with prolamine were due to its physical hardening properties or its biochemical components.

Tissucol (biologic tissue adhesive) was chosen because of its likeness in physical action to prolamine; the chemical components of the two substances differ. Injecting Tissucol 20 min after induction of pancreatitis produced the same results (10).

However, since both Tissucol and prolamine contain protein derivatives, we wanted to rule out this coincidence by using an inorganic substance, silicone, which shares the same physical properties but is not absorbed. The 10 dogs that received silicone after developing pancreatitis did not show any differences in results (11).

We believe that the mechanical action of blocking the pancreatic duct in 57 dogs that had developed acute necrotizing pancreatitis caused by the intraductal injection of calcium chloride reduced the overall mortality rate from 100% to 12.2% (Table 2).

Obviously, further studies must be done to gain a more thorough understanding of how and why mechanical ductal occlusion achieves such results.

In order to keep pace with progress made in therapeutic endoscopy, other experimental studies have been started in dogs and primates which attempt to show the advantages of endoscopically induced pancreatic ductal blockage.

Until now, treatment has been limited to the consequences of this severe illness. Our findings suggest that there could be a specific treatment to interrupt or control the pathophysiologic process of acute pancreatitis in the dog.

TABLE 2
Overall Mortality Rates in Dogs after the Induction of Acute Necrotizing Pancreatitis

Study group	No. of dogs	No. of deaths	Mortality rate
Phase I	5	5	100%
Phase II + III	57	7	12.2%

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Activity of pp60$^{c\text{-}src}$ Protein Kinase in Human Breast Cancer

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Abstract

Because there is elevation of pp60$^{c\text{-}src}$ activity in breast carcinoma tissue, we analyzed primary breast cancer tissue samples from 30 women to determine whether pp60$^{c\text{-}src}$ activity correlated with specific clinical parameters. We found that tumors with a progesterone receptor had higher pp60$^{c\text{-}src}$ activity than tumors without such a receptor. But there was no association of pp60$^{c\text{-}src}$ activity with the presence of an estrogen receptor or of nodes, or with menopausal status or age. The function of pp60$^{c\text{-}src}$ in normal cells and in breast cancer is unknown, as is the significance of our finding of an association of elevated pp60$^{c\text{-}src}$ activity and the presence of progesterone receptors.

The *src* oncogene is a gene carried by an RNA virus, a retrovirus. When the retrovirus infects an animal cell, its RNA is transcribed into DNA. Responsible for rapid oncogenesis, *v-src* was first identified in the early 1970s in Rous sarcoma virus, which causes cancer in chickens. It was named *src* for sarcoma. The protein encoded by *v-src* is designated as pp60 because its molecular weight is 60,000 d (1).

The *src* oncogene is not truly a viral gene. Instead, it is a nearly exact copy of a gene found in all chicken cells. The normal proto-oncogene was picked up by a weakly oncogenic retrovirus in the course of infection, and in the process it was transformed into a cancer gene (2).

Numerous oncogenes have been isolated from retroviruses that cause carcinoma, sarcoma, leukemia, or lymphoma in chickens, other birds, rats, mice, cats, and monkeys. All of these oncogenes are closely related to a normal gene in the host animal and encode an oncogenic transforming protein similar to a normal protein.

The *src* protein, pp60, is an enzyme that catalyzes the addition of a phosphate molecule to other proteins. Such enzymes are called *protein kinases,* from the Greek *kinein,* "to move." They transfer the energy-rich terminal phosphate group of adenosine triphosphate (ATP), the cell's major energy carrier, to the protein being modified. This phosphorylation process is an important modulator of protein function. Both pp60$^{v\text{-}src}$ and its cellular counterpart pp60$^{c\text{-}src}$ phosphorylate the amino acid tyrosine (3).

The most extensively studied of the tyrosine-specific protein kinases is pp60$^{c\text{-}src}$. This enzyme, encoded by the *c-src* gene, is the protein produced by the proto- (or cellular) oncogene *c-src*. It is closely related, but not identical, to pp60$^{v\text{-}src}$, the enzyme encoded by the Rous sarcoma virus transforming gene *v-src,* that is, the *src* oncogene (4).

Rosen et al have estimated the abundance of the *c-src* protein in human tumor tissue and human tumor cell lines (4). They found that pp60$^{c\text{-}src}$ kinase activity in breast carcinoma tissue was significantly elevated when compared to normal breast tissue. However, not all breast

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TABLE

Clinical Data, Tumor Hormone Receptor Status, and Tumor pp60$^{c\text{-}src}$ Activity in 30 Women

Clinical characteristics	No. Cases	pp60 (mean ± SD)	Significance
Nodal involvement*			
Negative	17	2.1 ± 1.2	
Positive	8	1.9 ± 2.1	p NS
Menopausal status*			
Premenopausal	13	2.0 ± 1.2	
Postmenopausal	13	1.7 ± 1.2	p NS
Age			
52 ± 16 yr	3	0	
55 ± 12 yr	9	1	f = 0.22‡
52 ± 14 yr	8	2	
52 ± 9 yr	6	3	
58 ± 12 yr	4	4	p NS
Estrogen receptor†			
Negative	17	1.7 ± 1.4	
Positive	13	2.2 ± 1.1	p NS
Progesterone receptor†			
Negative	10	1.3 ± 1.05	$t = 2.17$
Positive	20	2.3 ± 1.2	$p < 0.05$ 2-tailed

* Even though 30 women participated in this study, data on nodal involvement were available in only 25 cases, and data on menopausal status in only 26 cases.

† Although there was a significant difference between pp60 in progesterone-receptor positive and negative cases, the difference was not significant when estrogen and progesterone receptor data were combined and analyzed by one-way analysis of variance (f = 1.79).

‡ One-way ANOVA.

carcinoma cell lines had high levels of pp60$^{c\text{-}src}$ kinase activity.

In the study reported here, primary breast cancer tissue samples were analyzed to determine whether pp60$^{c\text{-}src}$ activity correlated with specific clinical parameters, including the presence of an estrogen receptor (ER) or progesterone receptor (PR) in the tumor.

Materials and Methods

Breast cancer tissue, removed from 30 women undergoing lumpectomies or mastectomies, was analyzed. All tumor tissue came from the primary lesion; none was taken from nodes.

The pp60$^{c\text{-}src}$ activity in the tissue specimens was measured by a sensitive in vitro immune complex protein kinase assay of cytoplasmic extracts of the specimens. The method has been described previously (4). Two monoclonal antibodies to pp60^{src} protein were used to ensure specificity. These antibodies were derived from mouse myeloma cells fused with spleen cells of mice immunized with purified pp60^{src}, produced from bacterial recombinants (5). Phosphotyrosine was identified as the kinase product.

Estrogen and progesterone receptor concentrations in tumor tissue were determined with a standard dextran-coated charcoal-binding assay (6). A receptor was considered to be present if there was greater than 5 fmol/mg cytosol protein of bound hormone.

The degree of pp60$^{c\text{-}src}$ kinase activity was determined by assaying the level of autophosphorylation and exogenous substrate phosphorylation in the presence of gamma ^{32}P-ATP. The degree of kinase activity was scored as 0 to 4, to allow for statistical correlation with other numerical parameters, 0 representing no detectable kinase activity, 1 representing normal breast tissue or fibroblast levels, and 2, 3, and 4 representing approximately fivefold, tenfold, and twentyfold increases in kinase activity respectively, as measured by scanning densitometry of the autoradiographs.

Results

Tumors with a progesterone receptor had higher pp60$^{c\text{-}src}$ activity than tumors without a receptor ($p < 0.05$, two-tailed). One-way ANOVA of ER and PR data was not significant (f = 1.79); also, there was no significant linear correlation between PR and pp60$^{c\text{-}src}$ levels ($r = -0.26$). (Table)

There was no significant relationship of pp60$^{c\text{-}src}$ activity to menopausal status or the presence of axillary lymph nodes pathologically positive for tumor. Women with maximal pp60$^{c\text{-}src}$ activity (+4) were slightly older than women with no detectable activity; but one-way analysis of variance revealed that overall, the age difference was insignificant. Moreover, the presence or absence of an estrogen receptor in the tumor tissue did not significantly correlate with pp60$^{c\text{-}src}$ activity.

Discussion

The progesterone receptor is at least as valuable as the estrogen receptor for predicting outcome in breast cancer patients (7). Indeed, the progesterone receptor may be the second most critical factor, after the number of positive nodes, in predicting disease-free survival. In addition, the presence of a progesterone receptor suggests a favorable response to tamoxifen therapy in women with both early and advanced breast cancer (7). Only amplification of the recently discovered HER-2/*neu* oncogene may rival the predictive power of the progesterone receptor (8).

The significance of our preliminary finding of an association between elevated $pp60^{c\text{-}src}$ activity and the presence of progesterone receptors in human breast cancer is unknown. The function of $pp60^{c\text{-}src}$ in normal cells and in breast cancer is also not known.

It is of interest that we found no significant association of $pp60^{c\text{-}src}$ activity with age or menopausal status. Studies of familial breast cancer, no doubt induced by one or more genes, show that this disorder occurs in young women who are predominantly premenopausal (9). We conclude, therefore, that there is probably no relationship between the *c-src* gene and familial breast cancer.

If more can be learned about this subject, our understanding of the pathogenesis of breast cancer might be broadened.

Acknowledgments

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Human Immunodeficiency Virus Infection in Transfused Patients with Acute Leukemia

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Abstract

The human immunodeficiency virus (HIV) is transmitted by sexual contact and by blood products. Patients with acute leukemia are extensively transfused as part of their supportive care. We conducted a retrospective study of the incidence of HIV antibody positivity in patients treated for acute leukemia at The Mount Sinai Medical Center between 1970 and 1986. Serum samples from 106 patients were studied, including 71 (67%) with at least one posttransfusion specimen. Six were found to have HIV antibodies. All positive specimens occurred in patients treated between 1980 and April 1985, when mandatory HIV testing of blood donors began. Twelve percent of the 51 patients studied from this time period underwent seroconversion documented by the presence of HIV-negative specimens prior to transfusion. These results show that these extensively transfused patients were at significant risk for HIV infection during the time period 1980 to April 1985.

The human immunodeficiency virus-1 (HIV-1), the retrovirus associated with acquired immune deficiency syndrome (AIDS), is known to be transmitted through sexual contact, transplacentally, and by exposure to infected blood and blood-derived products (1). More than 50% of hemophiliacs who have been treated with factor replacement therapy have developed serologic evidence of HIV-1 infection, and approximately 3% have developed AIDS (2). Although the incidence of HIV-1 infection, with or without the development of AIDS, following multiple transfusions is unknown, a picture is emerging from recent reports of dialysis patients and those with congenital anemias which describe infection rates ranging from 0.76% to 9% (3, 4).

AIDS has been reported throughout the United States, but the majority of cases have been clustered in four urban areas: San Francisco, Los Angeles, Miami, and New York. It is likely that the incidence of HIV positivity in the blood donor pool drawn from these areas prior to the introduction of donor testing would reflect this.

Patients with acute leukemia undergoing remission-induction therapy are extensively transfused with packed red cells, platelets, and, to a lesser extent, granulocytes and plasma derivatives as part of their supportive care. The risk of acquiring HIV infection as a result of supportive care for leukemia is unknown.

We have undertaken a retrospective study to determine the incidence of HIV antibody positivity in patients from the Greater New York Area treated for acute leukemia in New York between the years 1970 and 1986.

Materials and Methods

All patients treated for acute leukemia between 1970 and 1986 at The Mount Sinai Medical Center were eligible for study if frozen serum specimens were available. Follow-up specimens from living patients were also obtained. Sera from patients were tested for the presence of

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anti-HIV antibody using an enzyme immunoassay (Organon Teknika, Irving, TX). All serum samples were tested at least twice. All repeatedly positive samples were confirmed with the Western blot assay (5).

Protocol charts containing detailed information on clinical status, transfusion history, and chemotherapy were reviewed on all patients. Physical examinations were performed on all living patients. T-lymphocyte subsets were determined on all living patients.

The blood bank transfusion records were reviewed on all seropositive patients. Informed consent was obtained from all living patients, and the study was approved by the Research Advisory Committee–Institutional Review Board of Mount Sinai Medical Center.

Results

A total of 246 serum samples from 106 patients were studied. Seventy-seven (73%) of the patients had acute myelogenous leukemia (AML), 27 (25%) had acute lymphoblastic leukemia (ALL), and 2 patients were treated for blastic-phase chronic myelogenous leukemia.

Forty-four patients had specimens studied before and after treatment. An initial pretreatment specimen was not available on 27 patients; however, 13 of these patients had multiple subsequent specimens. Of the 71 (67%) patients for whom at least one posttransfusion specimen was available, 6 (8.5%) were found to have HIV antibodies by ELISA and Western blot analysis.

In 35 patients a single pretreatment specimen was available. One of these 35 patients had a positive ELISA but a negative Western blot and had received prior transfusions as supportive therapy for a myelodysplastic syndrome.

Five of the six seropositive patients underwent HIV seroconversion following their initial remission-induction treatment (Table 1). Patient no. 6 underwent remission-induction therapy on three occasions—in 1982, 1984, and 1985—and required intensive supportive therapy during each. HIV seroconversion occurred following her second remission-induction course in 1984. One of the patients (no. 2) has developed unexplained generalized lymphadenopathy and a reversed helper/suppressor T-cell ratio. The remaining patients have died of causes related to their leukemia, although patient no. 3 died in 1982 of disseminated Herpes zoster and interstitial pneumonia while in leukemic relapse.

TABLE 1
Clinical Characteristics of HIV-Positive Patients

Pt. no.	Age/Sex	Diagnosis	Year Treated	Survival (mo)
1	48/M	AML	1980	10
2	38/F	AML	1980	74+*
3	19/F	ALL	1981	19
4	34/F	AML	1981	9
5	68/F	AML	1982	10
6	69/F	AML	1982 1984 1985	31

AML, acute myelogenous leukemia; ALL, acute lymphoblastic leukemia.

* Has developed generalized lymphadenopathy and a reversed helper/suppressor T-cell ratio.

Of the 13 patients treated prior to 1980, none had HIV antibodies (Table 2). The first positive specimen was identified in December 1980 from a patient who was transfused in June 1980. The last positive specimen was identified in March 1985 from a patient transfused in October 1984. None of the seven patients treated after April 1985, when HIV testing of blood donors became mandatory, has become antibody positive.

Of the 51 patients treated between 1980 and April 1985, 6 (12%) became antibody positive after transfusion. An additional 5 patients treated during the same time period were found to be ELISA positive but Western blot negative. Four of these five patients were ELISA negative prior to transfusion. Of the 16 patients treated in 1981 and 1982, 7 became ELISA positive. Only 3 were Western blot positive. No ELISA-positive specimens were seen prior to 1980 or after April 1985.

All the seropositive patients had at least one prior negative serum specimen (Table 3). In 5 of 6 patients this specimen was obtained prior to exposure to any blood products. Patient no. 6 had received prior transfusions during her first re-

TABLE 2
Results of HIV Testing 1970–1986

Year treated	No. pts. tested	ELISA positive no.	WB positive no. (%)
1970–1979	13	0	ND
1980	8	2	2 (25%)
1981	10	4	2 (20%)
1982	6	3	1 (17%)
1983	10	0	ND
1984	10	1	1 (10%)
1/85–4/85	7	1	0
5/85–12/86	7	0	ND
Total	71	11 (15.5%)	6 (8.5%)

WB, Western blot; ND, no data.

TABLE 3
Seroconversion of Initially HIV-Negative Patients

Pt. no.	Date of specimen: Negative	Date of specimen: 1st positive	Days
1	6/02/80	12/30/80	181
2	11/10/80	8/22/86	2,141
3	4/23/81	3/16/82	327
4	12/15/81	7/30/82	227
5	2/04/82	10/04/82	242
6	10/22/84	3/21/85	150

mission-induction course in 1982, but was seronegative prior to treatment in 1984. For the remaining patients, the date of the negative specimen corresponds to the approximate date of the first blood product transfusion. The shortest time to documented seroconversion was 150 days.

In the seropositive patients, the average number of donor exposures was 154 (Table 4). The average numer of donor exposures for the seronegative leukemic patients during this time period was 145.

Discussion

Transfusion-related acquisition of the acquired immune deficiency syndrome (AIDS) was first recognized in patients with hemophilia who had received factor concentrates prepared from thousands of donors (6). Transfusion-related AIDS occurring outside the hemophilia population has now been described in 1,178 adults and represents 2% of all reported cases of AIDS (7). With the discovery of HIV and the development of serologic methods for detecting exposure to the virus, it has become possible to trace transfusion-related infection chronologically and within defined populations of transfusion recipients (8).

The Mount Sinai Medical Center treats a large number of leukemic patients. We have attempted to store serum specimens on all patients with acute leukemia prior to induction chemotherapy. We were thus able to demonstrate if and when seroconversion took place. We found HIV seroconversion in 12% of our 51 patients with acute leukemia treated between 1980 and April 1985. None of the seroconverters belonged to a high-risk group or had known exposure to HIV other than by transfusion. Our study is the first to document seroconversion in leukemic patients, because all of our positive patients had at least one prior negative specimen.

TABLE 4
Blood Products Received by Seropositive Patients

Pt. no.	RBC Units	PLT Units	Other
1	35	149	WBC × 4 days
2	30	215	
3	20	36	FFP 12 Cryo 60
4	10	36	
5	27	85	
6	21	150	

RBC, red blood cells; PLT, platelets; WBC, white blood cells; FFP, fresh frozen plasma; cryo, cryoprecipitate.

It does not appear that our seropositive patients were exposed to significantly more blood donors than our seronegative patients. HIV antibody positivity in patients with leukemia has recently been reported by another group in New York, 14% of their patients treated during this time period having antibody to the virus (9). The results of pretreatment specimens were not reported and thus it is not known how many of their patients were seropositive prior to transfusion.

Retrospective studies in patients with hemophilia have detected the first antibody positivity in 1978, the majority of seroconversions occurring in 1981–1983 (10). The incidence of HIV antibody positivity in patients with severe hemophilia A who have received non-donor-screened, non-heat-treated factor concentrate currently approaches 83% (11).

Patients undergoing remission-induction therapy for leukemia require transfusion with blood products as part of their supportive care. In contrast to patients with hemophilia, however, patients with leukemia are exposed to significantly fewer donors, usually less than 200, than hemophilia patients, who are exposed to 10–50 times that many. Leukemic patients typically require supportive therapy over a period of weeks and, rarely, months, whereas patients with hemophilia require blood products all their lives.

Clinical sequelae of HIV infection in this group are somewhat difficult to identify because of the concomitant complications of leukemic relapse and subsequent chemotherapy, although the patient with the longest follow-up (77 months) has developed unexplained lymphadenopathy and a reversed helper/suppressor T-cell ratio.

Patients who are ELISA positive but Western blot negative have been characterized as being falsely positive for HIV antibodies. This has been attributed to a variety of nonspecific factors, including transfusion-related HLA antibodies (12). The “falsely” positive ELISAs in our study were seen only in patients who were transfused after 1979 and before April 1985, when routine HIV antibody screening of blood donors was introduced. The significance of this finding is not known at the present time.

The implications of this study for other groups of patients who were heavily transfused during this time period are unknown, although the incidence of donor antibody positivity has been estimated at 0.04% (13). Our study suggests that the risk per blood component exposure may have been higher than this, at least in New York during this period of study prior to HIV screening.

These extensively transfused patients may represent a newly recognized risk group for transmission of HIV infection.

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Surgical Alternatives for the Treatment of Nonparasitic Liver Cysts

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Abstract

Four cases of nonparasitic liver cysts treated with different operative procedures are presented. Asymptomatic small cysts need not be treated. Moderate-sized cysts require treatment based on the presence or absence of infection. Infected cysts must be drained externally via catheters or by marsupialization. Noninfected cysts may be adequately drained internally through partial cyst wall excision or unroofing. Large bile-containing cysts are best drained internally using a Roux-en-Y cystojejunostomy.

Nonparasitic liver cysts are a rare form of hepatobiliary abnormality usually misdiagnosed during routine clinical examination. As either congenital or acquired abnormalities, these cysts may occur anywhere throughout the biliary duct system, at either an intrahepatic or an extrahepatic location. Symptoms, which may include abdominal pain, distension, nausea, and loss of appetite, typically develop as a result of pressure within the liver or secondary to compression of surrounding structures. Biliary tract obstruction and associated infection may also lead to symptoms. The lesions may be either small, solitary, unilocular enlargements or large, multilocular, polycystic diffuse masses.

The first reference to a solitary liver cyst was by Michel (1) in 1856, reporting a large cyst in a 60-year-old man. At approximately the same time, Bristowe (2) described the first case of polycystic kidneys. The next major contribution, in 1906, was by Moskowitz (3), who compiled findings in 85 cases of hepatic cysts. He concluded that hepatic cysts arose from aberrant bile ducts that had developed either in utero or secondary to acquired inflammatory processes. Moskowitz's theory has since become the accepted etiology of nonparasitic liver cysts and has been confirmed by the subsequent discovery of bile duct epithelium and duct elements within cyst walls.

The following report reviews the cases of four patients seen at the City Hospital Center at Elmhurst, NY, during the period 1975 through 1985, focussing on current therapeutic modalities available to the surgeon when treating nonparasitic cystic liver disease.

Case 1. A 73-year-old Colombian man was found on routine examination to have an enlarged nontender liver appreciated 5 cm below the costal margin. Further evaluation by liver scan and sonography revealed the right lobe of the liver to be almost completely replaced by a huge cystic mass.

Laboratory values included lactate dehydrogenase 275 μkat/L (normal <200 μkat/L) with increased L4, L5 fractions; and SGOT, SGPT, alkaline phosphatase, and total bilirubin all within normal limits. *Entamoeba histolytica* immunohemagglutination and complement fixation of *Echinococcus* were both negative.

The patient was followed up for two years without symptoms and then developed right upper quadrant pain, weakness, and anorexia. A fluctuant, tender liver mass was noted in association with white blood cell count of 9900/mm^3 (9.9 10^9/L) with 30% band forms.

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Following percutaneous aspiration of the cystic mass, laparotomy was performed, with evacuation of 3 L of purulent fluid. The cyst wall was exteriorized via marsupialization to the peritoneum and posterior rectus fascia. Intraoperative cultures were positive for *Escherichea coli* and anaerobes.

Subsequent visits, three years postoperatively, revealed the patient to be without symptoms. Repeat sonogram showed slight hepatomegaly without evidence of parenchymal defect.

Case 2. A 64-year-old Puerto Rican man had diffuse abdominal pain, poor appetite, and weight loss six weeks following cholecystectomy and common bile duct exploration performed at another institution. Examination showed enlarged, tender liver approximately 14 cm in span. Liver function tests included LDH-240, alkaline phosphatase-180 (normal <85), and total bilirubin 2.3 (normal <1.0). Liver scan (^{99m}Tc) and gallium scan both indicated a large process in the right lobe of the liver. Sonographic study further defined the lesion to be a cystic mass 10 cm by 12 cm by 15 cm. External drainage of the cyst was performed via a large-bore catheter. All intraoperative cultures, including bacterial and parasitic, were negative. The patient was followed up for two-and-a-half years postoperatively without recurrence of symptoms.

Case 3. A 53-year-old woman was evaluated for symptoms of cholelithiasis. Sonographic study revealed a large cyst in the right lobe of the liver. Liver scan (^{99m}Tc) supported the finding of a liver mass. At cholecystectomy, the patient underwent aspiration of the liver cyst with liver biopsy. Cyst fluid was clear without evidence of bile, and all cultures were negative. Cyst wall biopsy showed cuboidal epithelium consistent with nonparasitic cystic liver disease. The patient was last evaluated 10 mo postoperatively and at that time was asymptomatic. Sonogram revealed a small residual cyst.

Case 4. A 62-year-old Ecuadorian woman was evaluated for complaints of recurrent episodes of mild right upper quadrant abdominal pain and anorexia without change in weight. Physical examination revealed an enlarged, slightly tender liver measuring 14 cm below the right costal margin. Sonographic evaluation failed to document suspected biliary stones. However, a large cyst was noted in the right lobe of liver and many smaller cysts were seen throughout the liver parenchyma. CT scan further documented the dimensions of the large cyst in the right lobe and smaller additional cysts (Fig. 1). When the patient's nausea, abdominal pain, and anorexia became more acute, cyst decompression (Fig. 2), was performed. Intraoperative cyst fluid contained bile, and internal drainage was performed via Roux-en-Y cystojejunostomy (Fig. 3). Adjacent smaller cysts were drained via fenestration, producing communication to the larger cyst. The patient remained well without symptoms at 18 mo postoperatively.

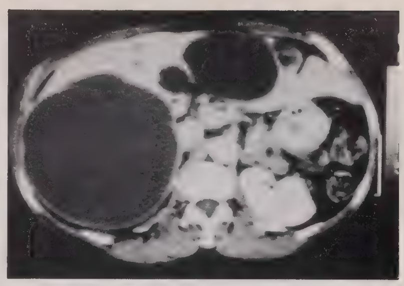

Fig. 1. Abdominal CT scan showing large right lobe of liver cyst and additional cysts.

Discussion

Prior to 1954, the most comprehensive study of nonparasitic liver cysts was by Davis (4), who described 499 cases, 226 found surgically and 273 at autopsy. Davis categorized the cysts as 187 solitary unilocular, 20 solitary multilocular, 241 multiple cysts, and 51 not classified.

In 1954, Henson, Gray, and Dockerty (5) at the Mayo Clinic, contributed an excellent review of the literature, separate from their own series of 12 cases. In 1971, Longmire et al (6) reviewed

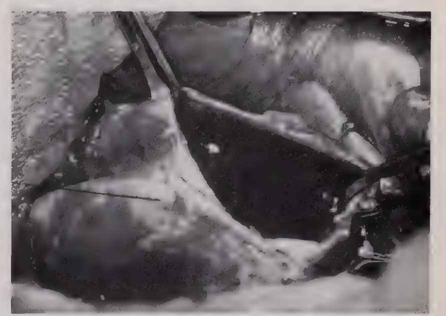

Fig. 2. Operative opening of cyst in preparation for cystojejunostomy.

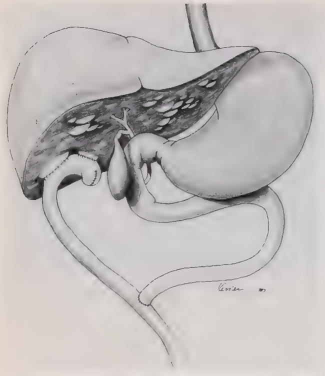

Fig. 3. Schematic representation of Roux-en-Y cystojejunostomy.

the records of 58 patients at UCLA and Wadsworth Veterans Hospitals during the years 1956–1971. These authors presented 43 cases of intrahepatic cysts of two varieties, ductal and primary parenchymal, and 19 cases of extrahepatic cystic lesions. Sanfelippo et al (7), also at the Mayo Clinic, continued the work of Henson et al. (5), describing 150 cases of hepatic cystic disease in the years 1954–1971; 82 of these cases were solitary and 49 were multiple, but only 25 were symptomatic.

Liver cysts are either acquired or congenital. Congenital cysts constitute approximately 90%–95% of all cases, and the majority of afflicted patients are asymptomatic. Moskowitz (3) noted that all forms of congenital cysts appear to contain aberrant bile ducts, believed to be formed in utero, cystic changes occurring subsequent to obstructive or inflammatory processes. Acquired cysts, 5%–10% of all cases, are of three varieties: inflammatory, traumatic, or proliferative. The hepatocyte is believed to be responsible for the proliferative cysts. Women tend to develop nonparasitic liver cysts twice as often as men, predominantly in the age group over 40 years.

Most patients with congenital liver cysts remain asymptomatic until cyst size produces the symptoms of abdominal pain, nausea, vomiting, distension, and loss of appetite. Examination often reveals evidence of abdominal tenderness and mass (5–8). Diagnostic tools include contrast studies, which show displacement of stomach and colon by extrinsic pressure. Liver scanning, using technetium 99m labeled sulfur colloid, is highly sensitive in defining defects within liver parenchyma. Ultrasound, the most specific, both in ability to delineate a mass lesion and to further define the consistency of the lesion, has become the initial diagnostic test of choice. CT scan, although more expensive, is also accurate in defining intrahepatic cysts and will usually differentiate between a cyst and a solid lesion.

Treatment of symptomatic patients is determined by cyst characteristics and size. Surgical treatment is reserved for those cysts that become infected or that cause symptoms by displacing or compressing the adjacent organs. Small cysts, less than 5.0 cm in diameter, may not require treatment if serial sonograms show no trend toward progressive enlargement, as in case 3. Moderate-sized, noninfected cysts, 5–10 cm in diameter, may be aspirated percutaneously and followed up by sonogram for recurrence, whereas infected cysts must be drained externally either by drains that provide for irrigation of the cyst cavity, as in case 2, or via a more formal marsupialization procedure, as in case 1.

Large cysts containing bile, indicating communication with bile ducts, require internal drainage by Roux-en-Y cystojejunostomy, as in case 4 (Fig. 3). It is extremely important that the defunctionalized loop of the jejunum is at least 45 cm long, sufficient to prevent reflux into the cyst of small-bowel content that can cause infection of the cyst. For large cysts associated with adjacent smaller ones deep within the liver parenchyma, partial excision of cyst wall and fenestration of septa to provide communication permits satisfactory treatment. Cysts containing clear fluid may be unroofed and drained directly to the peritoneal cavity, as described by Hadad (8).

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Hemodynamic Effects of Verapamil During Fentanyl–Nitrous Oxide Anesthesia

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Abstract

The hemodynamic effects of a verapamil infusion were investigated in six dogs given fentanyl–nitrous oxide anesthesia. Verapamil, 0.2 mg/kg, was given followed by an infusion of 3, 6, and 9 μg/kg per minute, which produced plasma verapamil concentrations ranging from 98 to 204 ng/ml. Verapamil significantly reduced the systemic vascular resistance index and mean arterial pressure. The decrease in afterload led to an increase in cardiac index, since there was little change in myocardial contractility (LV dP/dt). Administration of calcium chloride, 20 mg/kg, did not reverse the hemodynamic effects of verapamil. The data indicate that in dogs verapamil can be given, even in high concentrations, during fentanyl–nitrous oxide anesthesia without serious adverse electrophysiologic or hemodynamic consequences.

Verapamil is a calcium channel blocking agent which can be used intraoperatively for the management of cardiac dysrhythmias and myocardial ischemia (1–5). Several studies in animals have described the use of intravenous verapamil in association with volatile anesthetic agents (6, 7). Patients with coronary artery disease are most likely to receive fentanyl–nitrous oxide anesthesia instead of volatile anesthetic agents and may benefit from intraoperative administration of verapamil.

The present study, using a dog model, was designed to investigate the cardiovascular effects of different concentrations of verapamil during fentanyl–nitrous oxide anesthesia.

Methods

Six mongrel dogs (22.5 ± 1.5 kg) were anesthetized with sodium thiopental (20 mg/kg), intubated, and ventilated to normocapnia with a mixture of 50% nitrous oxide and oxygen. Nitrous oxide was used to ensure an adequate depth of anesthesia. Fentanyl, 50 μg/kg, and pancuronium, 0.1 mg/kg, were given, followed by a continuous infusion of fentanyl at 0.5 μg/kg per minute. Temperature was maintained between 37°C and 39°C with a circulating water blanket and a heating lamp. Instrumentation included a limb lead II of the electrocardiogram; percutaneous femoral arterial catheter; a percutaneous flow-directed, thermistor-tipped pulmonary artery catheter; and a Millar PC471 catheter with a microtip pressure sensor inserted into the left ventricle (LV).

Lead II of the ECG, heart rate (HR), phasic and mean arterial pressure (MAP), pulmonary arterial pressures (PAP), central venous pressure (CVP), and LV pressures, as well as electronically derived LV dP/dt, were all continuously recorded. Pulmonary capillary wedge pressure (PCWP) was intermittently recorded. Cardiac output was measured in triplicate by thermodilution (Edwards). Cardiac index (CI), stroke volume index (SVI), systemic and pulmonary vascular re-

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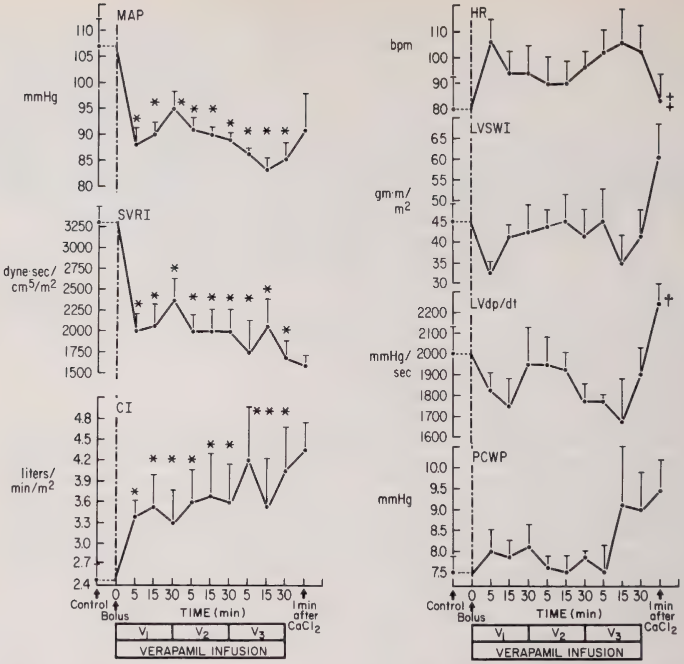

Fig. Hemodynamic values, mean ± SEM, before and after intravenous verapamil (0.2 mg/kg bolus and infusion at 3 μg/kg/min, V_1; 6 μg/kg/min, V_2; and 9 μg/kg/min, V_3) and following calcium chloride (20 mg/kg). * = $p < 0.05$ compared with control. † = $p < 0.05$ compared with V_3 at 30 min. ‡ = $p < 0.01$ compared with V_3 at 30 min.

sistance indices (SVRI, PVRI), and left and right ventricular stroke work indices (LVSWI, RVSWI) were calculated using standard formulae.

Control measurements were taken after 30 min of stable hemodynamic parameters. An intravenous bolus of verapamil, 0.2 mg/kg, was given over 2 min, followed by a continuous infusion at 3 μg/kg per minute (V_1), 6 μg/kg per minute (V_2), and 9 μg/kg per minute (V_3). Each infusion period lasted 30 min. Hemodynamic measurements were obtained at 5, 15, and 30 min during each infusion period. Calcium chloride, 20 mg/kg, was given after the final infusion period (V_3), and the measurements were repeated at 1 min.

Arterial blood was taken for measurements of blood gas tension, electrolytes, hematocrit, and plasma verapamil concentration at the end of each infusion period. The total serum calcium level was also obtained before infusion of calcium chloride. Values obtained at each administration period were compared to control by repeated measures of analysis of variance. Paired T tests were used to compare hemodynamic values at V_3 with those obtained after calcium administration. $P > 0.05$ was considered significant for all variables studied.

Results

Five minutes after the bolus injection, verapamil significantly reduced MAP from 107 ± 11.2 to 88 ± 6.1 mmHg and SVRI from 3332 ± 447 to 2,005 ± 351 dynes/sec/cm^5/m^2 and increased CI from 2.50 ± 0.43 to 3.35 ± 0.47 L/min/m^2 (Fig.). With increasing doses of verapamil, MAP and SVRI were progressively reduced and CI continued to increase. Minimal depression of myocardial contractility (LV dP/dt) was observed throughout the study. Atrioventricular conduction, as observed on the electrocardiogram, was not significantly affected at any concentration of verapamil. Other hemodynamic variables did not change significantly throughout the study.

The table shows the plasma verapamil levels obtained at the end of each infusion of verapamil and results of the laboratory studies. Serum calcium concentration at the end of verapamil infusion was within normal limits (9.93 ± 26 mg/dL). Paired T tests showed no significant changes in any of the biochemical data.

Discussion

It has previously been established that during inhalation anesthesia, verapamil produces further myocardial depression as a result of pharmacokinetic and pharmacodynamic interaction (5–7). Since verapamil may be indicated intraoperatively in patients with depressed cardiac function, it is important to know the interactions between verapamil, fentanyl, and nitrous oxide.

High-dose fentanyl has been shown to produce adequate anesthesia and remarkable cardiovascular stability (8, 9). Therefore, it has been advocated as the anesthetic agent of choice in patients with serious heart disease requiring general or cardiac surgery. No data have been published on the effect of a continuous infusion of different concentrations of verapamil during high-dose fentanyl–nitrous oxide anesthesia in either animals or humans.

In the present study, the predominant hemodynamic effects of verapamil were significant reductions in SVRI and MAP. With increasing plasma concentrations of verapamil, changes in SVRI and MAP were enhanced (Fig.). The small increase in heart rate observed during the infusion may have been related to a reflex response to the peripheral vasodilation induced by verapamil. There appeared to be minimal myocardial depression, as reflected in LV dP/dt and LVSWI at each concentration of verapamil. Cardiac index was constantly augmented, which may be explained by a reflex increase in heart rate, direct sympathetic stimulation, or the reduced left ventricular afterload caused by pronounced vasodilation. The combination of these effects may have canceled the direct negative inotropic effects produced by the highest plasma levels of verapamil.

In two previous clinical studies, verapamil was administered as a bolus dose during opiate-based anesthesia (10, 11). Two minutes following the bolus injection, the plasma concentration of verapamil was below therapeutic levels; therefore, evaluation of the hemodynamic effects of verapamil over a longer time period was not possible.

Kates and Kaplan (10) investigated the interaction between morphine and verapamil in patients undergoing coronary artery bypass surgery. Patients with good left ventricular function were anesthetized with 0.5–1.5 mg/kg of morphine, 0.3–1.0 mg/kg of diazepam, and 50% nitrous oxide and oxygen. A single intravenous bolus of verapamil, 0.075 mg/kg, was given over 1 min, prior to cardiopulmonary bypass. Verapamil produced significant reductions in mean arterial pressure (25%), systemic vascular resistance (33%), and left ventricular stroke work index (33%). These hemodynamic changes were well tolerated and had no adverse effect during cardiopulmonary bypass or in the postoperative period.

Kapur et al (11) studied the effects of verapamil, either 0.075 mg/kg or 0.15 mg/kg, in patients with good left ventricular function, immediately after induction of anesthesia with diazepam, 10–15 mg, fentanyl, 100 μg/kg, and pancuronium. Verapamil did not cause significant further reduction in SVR, MAP, and LVSWI following induction of anesthesia. Cardiac output was well maintained in all the patients. In these studies all patients were receiving nitrate preparations and a variable number of beta blockers and calcium channel blockers, which may have been expected to influence the results.

TABLE
Verapamil Plasma Concentration and Laboratory Data
(Mean ± SEM)

	Control	V_1	V_2	V_3
Plasma verapamil (ng/ml)	—	97.7 ± 37.2	136.5 ± 38.7	204 ± 92.8
Sodium (mmol/L)	143.8 ± 0.83	142.0 ± 0.93	141.1 ± 1.30	140.8 ± 1.16
Potassium (mmol/L)	3.5 ± 0.16	3.33 ± 0.13	3.45 ± 0.29	3.31 ± 0.10
Hematocrit (%)	41.3 ± 1.68	42.6 ± 1.50	43.5 ± 1.26	43.8 ± 1.34
pH	7.41 ± 0.02	7.39 ± 0.02	7.36 ± 0.02	7.34 ± 0.02
pCO_2 (mmHg)	34.6 ± 2.89	35.9 ± 3.95	37.4 ± 3.43	41.4 ± 3.29
pO_2 (mmHg)	189 ± 14.1	170 ± 13.5	173 ± 17.4	166 ± 15.5
Bicarbonate (mmol/L)	21.46 ± 0.78	19.8 ± 0.69	21.41 ± 1.85	21.86 ± 1.08

The present study in dogs allowed investigation of the cardiovascular effects of verapamil in the presence of fentanyl, in isolation from other drugs that may influence any potential interaction. The direct myocardial depressive action of nitrous oxide at 50% concentration is likely offset by the indirect sympathetic stimulation produced by nitrous oxide. Furthermore, the hemodynamic effects produced by low, medium, and high plasma levels of verapamil could be assessed.

Calcium chloride was given to reverse the hemodynamic changes produced by verapamil. Although myocardial contractility was increased, the systemic arterial vasodilation and hypotension induced by verapamil were not antagonized by calcium chloride. An alpha adrenergic agonist, such as phenylephrine, may be more effective for correction of the peripheral vasodilation following large doses or prolonged infusion of verapamil.

In conclusion, infusion of increasing concentration of verapamil during fentanyl–nitrous oxide anesthesia was not associated with any disturbances of intracardiac conduction or major depression of myocardial contractility. To the extent that data obtained in animals are clinically relevant, verapamil can be given during fentanyl–nitrous oxide anesthesia without serious adverse hemodynamic consequences.

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Overwhelming Postsplenectomy Infection in Patients with Thalassemia Major

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Abstract

The efficacy of pre- and post-operative protection against overwhelming postsplenectomy infection was evaluated in a prospective study of 98 patients with thalassemia major. All patients were vaccinated four to ten weeks pre-operatively with a polyvalent antipneumonococcal vaccine; after their discharge from the hospital they received 1,000,000 units (625 mg) of oral penicillin daily for one to two years and have been closely followed up since then. The incidence of overwhelming infection among our patients was 1.02%. This very low incidence suggests that vaccination and prophylactic penicillin administration, combined with careful follow-up, provide adequate protection against overwhelming infection in splenectomized patients with thalassemia major.

Overwhelming postsplenectomy infection is a very serious complication with grave prognosis. The risk of this disorder is approximately 1.45% after splenectomy for trauma, but rises significantly when removal of the spleen is performed for a serious primary disease (1–4). Thus, the incidence of the disorder in patients suffering from thalassemia major is estimated to be close to 25% (1, 5).

Because of the high frequency of the disease among the Greek population, a prospective study was undertaken to evaluate the efficacy of pre- and postoperative protection against sepsis of patients with thalassemia major undergoing splenectomy.

Patients and Methods

During the five-year period 1981–1986, 98 patients with thalassemia major underwent splenectomy. Forty patients were male, and 58 female. Mean male age was 18.7 years (range 14–26 years) and mean female age 17.5 years (range 14–39 years).

The most common indication for the operation was hypersplenism or excessive organ size. Cholecystectomy, appendectomy, and liver and muscle biopsy were also performed in certain patients:

20	splenectomy
3	splenectomy + cholecystectomy
18	splenectomy + cholecystectomy + appendectomy
57	splenectomy + cholecystectomy + appendectomy + liver and muscle biopsy

The preoperative management of the patients included a complete blood count, evaluation of the cardiorespiratory function, blood transfusions as necessary, and administration of vitamin K. Four to ten weeks before admission, the patients were vaccinated with a polyvalent antipneumonococcal vaccine, containing antigens of fourteen serotypes of pneumonococcus (Pneumovax). Postoperatively all patients received antipneumonococcal antibiotics parenterally, which were discontinued after three days, when penicillin by mouth was administered at a dose of 1,000,000 units (625 mg) once daily (phenoxymethylo-penicillin). Patients over 20 years old received penicillin for one year, whereas patients under 20 received penicillin for two years.

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The mean postoperative hospitalization was 11.8 days. Since their discharge from the hospital the patients have been closely followed up (mean follow-up period 32 mo). The patients undergo clinical examination by a surgeon and a complete blood count every 3 months. No patient has been lost to follow-up. All patients were made fully aware of their increased susceptibility to infection and have been instructed to report every episode of fever or minor infection.

Results

One operative death occurred among our patients, caused by cerebral hemorrhage.

One case of overwhelming infection was detected fifteen months postoperatively. A 20-year-old man had severe pneumonia, followed by septicemia and septic shock. The patient had received Pneumovax vaccination and had discontinued penicillin 3 months prior to the episode. Blood culture revealed *Streptococcus pneumoniae* to be the causative agent. In the intensive care unit aggressive antibiotic therapy against pneumonococci was initiated with penicillin 2,000,000 units (1.25 g) every two hours. The patient was intubated and remained on mechanical ventilation for 15 days. He was discharged from the hospital 25 days later and remains in excellent condition 33 months after the episode. The incidence of sepsis among our 98 patients was thus estimated to be 1.02%.

Discussion

The incidence of overwhelming infection among splenectomized patients ranges from 1.4% to 25%, depending mainly on the primary disease (1, 2, 5). The frequency of overwhelming infection following splenectomy among patients suffering from thalassemia major rises to as high as 25% (5, 7). Due to this increased risk, close cooperation between the physician and the patient, along with a detailed explanation of the increased frequency of sepsis, is of paramount importance (8, 9). *Pneumonococcus* is the organism responsible for overwhelming infection in 50% of cases; other microorganisms, such as *Escherischia coli* and *Hemophilus influenza,* are identified less frequently (10). Thus, the use of polyvalent antipneumonococcal vaccines may in part diminish the risk of sepsis. Vaccination with a polyvalent vaccine was used in all our patients, delivered one or two months preoperatively to obtain an adequate antibody response (11). Prophylactic penicillin at a dose of 1,000,000 units per day was also administered for one to two years postoperatively because of the increased risk of sepsis during this period (12).

Although the authors had no previous experience with overwhelming postsplenectomy infection in patients with thalassemia major before this study, it seems that the combination of vaccination, prophylactic penicillin administration, and close follow-up of our patients was responsible for the very low incidence of the disorder among a group of highly susceptible individuals.

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Alfentanil and Midazolam: New Anesthetic Drugs for Continuous Infusion and an Automated Method of Administration

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Alfentanil, a synthetic opioid, and midazolam, a benzodiazepine, are new anesthetic agents recently available in the United States. They follow their familial predecessors, fentanyl and sufentanil in the former case and diazepam in the later, with very desirable pharmacologic activity and are novel primarily with respect to their pharmacokinetic characteristics; alfentanil and midazolam have significantly shorter elimination half-lives than other drugs of their class. In many situations, these drugs are most satisfactorily administered by continuous infusion, and it may be that for these and other drugs, continuous infusion is best implemented through the use of a semiautomated device.

Alfentanil

Pharmacology. Alfentanil is the newest of the piperidine derivatives released in the United States for use during anesthesia. It follows fentanyl and sufentanil as a highly potent analgesic. It is provided as a clear, preservative-free solution (pH 4–6) in a concentration of 500 $\mu g \cdot mL^{-1}$.

Alfentanil acts as a pure mu agonist on the central nervous system. Its potency is one-third to one-seventh that of fentanyl (1, 2). Its onset of action is faster than that of fentanyl, although changes seen on EEG are identical (3). Alfentanil, although less potent than fentanyl, has a much higher affinity for the opiate receptor (4). Thus, the higher plasma concentration required and its higher receptor affinity probably result in its more rapid onset of action.

Alfentanil, like fentanyl, produces minimal effects on the cardiovascular system (5). It does produce a slight slowing of heart rate (5), but preload and contractility are not affected. A drop in blood pressure (due to a reduction in afterload) may be seen with alfentanil and is related to the size of the dose, speed of injection, physical status of the patient, and concomitant medication (6). It has been recommended that alfentanil should not be given at a rate greater than 50 $\mu g \cdot kg^{-1} \cdot min^{-1}$ to avoid hypotension (6). Its interactions with other drugs (e.g., benzodiazepines) are similar to those seen with fentanyl (7). Alfentanil produces a dose-dependent respiratory depression, which is reversed (8) by naloxone, and like all other opiates, at high doses it produces chest wall rigidity (9).

From the preceding, it is obvious that alfentanil is similar in its pharmacodynamic action to its predecessors, fentanyl and sufentanil. Alfentanil, however, is different than fentanyl and sufentanil with regard to its pharmacokinetics (Table 1). The differences in pharmacokinetics are due to alfentanil's much lower lipid solubility and its lower potency (10). With respect to the dose administered ($\mu g \cdot kg^{-1}$), alfentanil has one-third to one-seventh the potency of fentanyl. If, however, potency is defined in terms of plasma level ($ng \cdot mL^{-1}$), the potency of alfentanil is of the order of one-fiftieth to one-seventieth that of

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TABLE 1
Comparative Pharmacokinetics of Fentanyl, Sufentanil, and Alfentanil

	V_D ($L \cdot kg^{-1}$)	$t_{1/2}\ \alpha$ (min)	$t_{1/2}\ \beta$ (hr)	CL ($mL \cdot kg^{-1} \cdot min^{-1}$)
Fentanyl	3–5	10–15	2–4	10–22
Sufentanil	2–3	10–15	2–4	9–14
Alfentanil	0.4–1.0	5–15	1.5–2	3–8

V_D, volume of distribution at steady state; $t_{1/2}\ \alpha$, distribution half-life; $t_{1/2}\ \beta$, elimination half-life; CL, clearance.

fentanyl. Alfentanil and fentanyl are metabolized by the same liver enzyme system. Because the serum concentration of alfentanil at an equipotent dose is much higher, the amount of drug presented to the liver per unit time is much greater for alfentanil than for fentanyl. Thus, even though the clearance of alfentanil is less than that of fentanyl, the total amount of alfentanil metabolized is much greater.

Alfentanil has a much smaller volume of distribution than fentanyl (Table 1), and therefore the ratio of alfentanil concentration in nonspecific binding sites (e.g., fat and muscle) to that in plasma is much smaller than for fentanyl. Therefore, at equipotent plasma levels, as alfentanil is metabolized, the amount of drug returning to the plasma from other compartments is much less with alfentanil than with fentanyl. Thus, the rate at which the plasma level falls is much faster for alfentanil (compared to fentanyl) and its $t_{1/2}\beta$ (elimination half-life) is much shorter. With these pharmacokinetic characteristics alfentanil can be administered by continuous intravenous infusion at appropriate anesthetic concentrations for any length of surgery. When the infusion is terminated, the alfentanil level drops rapidly, so that soon after the end of surgery, adequate spontaneous ventilation and awakening usually occur (Fig. 1).

TABLE 2
Cp50 Values for Alfentanil When Combined with 66% N_2O (15)

Event	Cp_{50} plasma alfentanil (ng/ml)
Intubation	475
Skin incision	279
Superficial surgery (breast)	270
Upper abdominal	412
Lower abdominal	309
Skin closure	150
Spontaneous ventilation	223

The kinetics of alfentanil are altered by age (patients over 40 have decreased clearance) (11), sex (females have a 15% increase in volume of central compartment) (11), and hepatic or renal disease. Kinetics are not altered by the duration of the procedure or by the concomitant use of inhalational anesthetics (11).

Alfentanil has been used for the induction of anesthesia by intermittent boluses for short procedures (1, 2) and by continuous infusion for short and long procedures (12, 13). For the induction of anesthesia the ED90 for unconsciousness is 100 $\mu g \cdot kg^{-1}$ and the ED90 for anesthesia (tolerating a nasopharyngeal tube) is 170 $\mu g \cdot kg^{-1}$ (9). The induction dose, therefore, varies from 100 to 180 $\mu g \cdot kg^{-1}$. Compared to induction doses of thiopental, etomidate, and midazolam, alfentanil produced the least hemodynamic change following induction and intubation (14).

Continuous Infusion. The pharmacokinetics of alfentanil make it highly suitable for the maintenance of anesthesia using a continuous infusion. The maintenance of an adequate depth of anesthesia is dependent on providing an adequate partial pressure (for an inhalational agent) or plasma concentration (for an intravenous agent) for the surgical stimulus (15). MAC (16) was initially developed as a measure of anesthetic potency, thus allowing a comparison of inhalational agents. However, the MAC and MAC_{bar} (17) of an inhalational agent also provide a guideline concentration for administration of the agent during surgery. To provide the same information for intravenous agents, Ausems et al advanced the concept of Cp50 for intravenous agents (15). Cp50 is the minimal plasma concentration that will prevent a motor or sympathetic response in 50% of patients for a given stimulus (15). The Cp50 could be called the MIC (minimal intravenous concentration) since it is conceptually akin to MAC for inhalation anesthetics.

Alfentanil alone is not an adequate anesthetic and therefore must be combined with an hypnotic during surgery. The Cp50s for alfentanil have so far been determined in the presence of 66% N_2O (see Table 2). If another hypnotic is substituted for nitrous oxide, it is possible that the Cp50 will vary. There are several important features to note with the Cp50 for alfentanil: (a) The Cp50 is greatest at the beginning of anesthesia/surgery (Cp50 intubation 475 $ng \cdot mL^{-1}$, skin incision 279 $ng \cdot mL^{-1}$) and decreases toward the end of surgery (Cp50 skin closure 150 $ng \cdot mL^{-1}$) (15). (b) The Cp50 for skin closure is less than the Cp50 for adequate ventilation (223 $ng \cdot mL^{-1}$) (15). Thus, if alfentanil has been correctly titrated during surgery, once the nitrous oxide (which at 66% contributes approximately 0.6 MAC) is eliminated, rapid recovery with spontaneous ventilation should occur. (c) The development of the Cp50 for alfentanil and other agents will allow comparisons between intravenous agents. Knowledge of the Cp50 and the use of automated infusion devices (see below) enables intravenous anesthesia to be delivered in a manner similar to inhalational anesthetics (18, 19) and thus allows comparisons between gaseous and intravenous anesthetics (19).

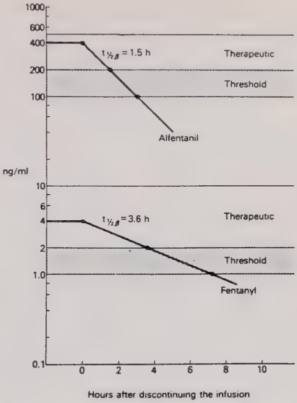

Fig. 1. Simulation of decrease in plasma levels of fentanyl and alfentanil once administration is terminated after reaching steady state at equipotent plasma concentrations. Time for plasma concentration of each agent to fall below threshold level for spontaneous ventilation (shaded area) is much sooner for alfentanil. (*Reproduced with permission from ref. 43.*)

An infusion scheme with alfentanil for the maintenance of anesthesia should utilize the known pharmacokinetics of the drug and the appropriate predefined plasma level and should be titrated against responses of the patient. There are several techniques (both automated and manual) to obtain and maintain a steady plasma level. In general a loading dose is required to fill the central compartment. This is then followed by an exponentially decreasing infusion rate to compensate for redistribution until a steady state occurs. Once a steady state has been obtained, an infusion proportional to the clearance is necessary. The capacity to obtain, maintain, or vary the plasma concentration of alfentanil is best achieved using a computer-assisted infusion device (18). However, at present, a manual technique is usually employed. To obtain a suitable plasma level for intubation, a loading dose of 50–100 $\mu g \cdot kg^{-1}$ is required, followed by an infusion rate of 3 $\mu g \cdot kg^{-1} \cdot min^{-1}$, which is reduced during the course of the procedure. Because narcotics in overdose do not necessarily produce hemodynamic depression (that is, have a very flat hemodynamic dose-response curve), it is important that the infusion be continuously reduced throughout the surgical procedure until patient response indicates that the level of alfentanil is inadequate. If and when patient responsiveness indicates that the plasma level of alfentanil is insufficient, a bolus of 7–15 $\mu g \cdot kg^{-1}$ is given to raise the plasma level. A bolus is preferable to increasing the infusion rate, because it takes four half-lives before a new plasma level is achieved by an increase in infusion rate. If the patient is maintained just above the minimum therapeutic level required to maintain anesthesia, then the infusion of alfentanil can usually be discontinued 20 min prior to the end of the procedure (12, 13). This will allow for rapid awakening and spontaneous ventilation once nitrous oxide is discontinued. The Mini-Infuser alfentanil infusion pump has been designed to simplify the manual administration of alfentanil by infusion for the maintenance of anesthesia.

Alfentanil is a narcotic with pharmacodynamic properties very similar to those of both fentanyl and sufentanil. However, its unique pharmacokinetic properties enable it to be administered via continuous infusion for the maintenance of anesthesia and still allow a rapid recovery.

Midazolam

Pharmacology. Midazolam is an imidazobenzodiazepine derivative with a fused imidazole ring that is different from classic benzodiazepines. The unique chemical structure of midazolam confers a number of physical chemical properties that distinguish it from other benzodiazepines, especially in terms of its solubility and pharmacokinetics. The imidazole ring accounts for the bascity, stability in an aqueous solution, and rapid metabolism (20). The drug has all the pharmacodynamic actions of other benzodiazepines, including sedation, hypnosis, amnesia, muscle relaxion, and anticonvulsant actions. It is 3–4 times more potent than diazepam.

Midazolam solubility is pH dependent. In an acidic pH (<4.0) midazolam is soluble in water. In a neutral or physiologic pH (>4.0) midazolam is lipid soluble. In fact, midazolam is among the most lipid soluble of benzodiazepines at physiologic conditions. This pH-dependent solubility is ideal for the clinician since on the shelf or in the syringe, the drug is water soluble, but in the body, it is lipid soluble and therefore will cross the blood-brain barrier rapidly to produce effects in the central nervous system.

The metabolism of midazolam occurs in the liver and involves hydroxylation by hepatic microsomal oxidative enzymes. The fused imidazole ring is oxidized very rapidly by the liver, much more rapidly than the methylene group of the diazepam ring of other benzodiazepines. There are two principal hydroxy metabolites, which are relatively inactive and short-lived (21). The relatively rapid hepatic metabolism results in pharmacokinetic characteristics that are significantly different than those of diazepam (Table 3). Although the volumes of distribution of diazepam and midazolam are similar, the much greater clearance of midazolam results in a significantly shorter elimination half-life.

Continuous Infusion. The greater clearance and shorter half-life make midazolam more suitable for repeated administrations and continuous infusions than diazepam. Indeed, recent studies have reported the continuous infusion of midazolam for the induction of anesthesia, the maintenance of anesthesia, and the maintenance of sedation in postoperative patients and patients requiring intensive care. Midazolam has been used for "total intravenous anesthesia" in conjunction with alfentanil for gynecologic surgery (22). Infusion schemes designed to maintain plasma midazolam blood levels of 250–300 $\mathrm{ng \cdot mL^{-1}}$ were used. To obtain 250 $\mathrm{ng \cdot mL^{-1}}$, patients were given a loading dose of 0.25 $\mathrm{mg \cdot kg^{-1}}$ followed by an infusion of 0.65 $\mathrm{mg \cdot kg^{-1} \cdot hr^{-1}}$ for 15 min and a maintenance infusion of 0.13 $\mathrm{mg \cdot kg^{-1} \cdot hr^{-1}}$. To achieve the higher blood level (300 $\mathrm{ng \cdot mL^{-1}}$), patients were loaded with 0.3 $\mathrm{mg \cdot kg^{-1}}$, followed by a 15-min infusion at the rate of 0.68 $\mathrm{mg \cdot kg^{-1} \cdot hr^{-1}}$ and a maintenance infusion of 0.125 $\mathrm{mg \cdot kg^{-1} \cdot hr^{-1}}$. These infusion schemes did achieve and maintain the desired plasma level, and in conjunction with alfentanil (75 $\mathrm{\mu g \cdot kg^{-1}}$ bolus followed by 5 $\mathrm{\mu g \cdot kg^{-1} \cdot min^{-1}}$ for 15 min and then 1.0 $\mathrm{\mu g \cdot kg^{-1} \cdot min^{-1}}$) anesthesia was satisfactorily maintained. The mean plasma concentration of midazolam at the time of extubation was 166 ± 38 $\mathrm{ng \cdot mL^{-1}}$, and the mean time for extubation until the patient was able to give her name and date of birth was 76 min (mean plasma concentration of midazolam at this time was 104 $\mathrm{ng \cdot mL^{-1}}$). Awakening and extubation after general anesthesia probably occur at plasma levels less than 150 $\mathrm{ng \cdot mL^{-1}}$ (22, 24, 25), but this level may be as much as twofold higher if midazolam has been used for sedation infusion (25). Whether this is a form of acute tolerance remains to be proven.

TABLE 3
Comparison of Pharmacokinetic Variables

	V_D ($\mathrm{L \cdot kg^{-1}}$)	$t_{1/2}\,\alpha$ (min)	$t_{1/2}\,\beta$ (hr)	CL ($\mathrm{mL \cdot kg^{-1} \cdot min^{-1}}$)
Diazepam	0.7–1.7	30–60	24–57	0.24–0.53
Midazolam	1.1–1.7	6–15	1.7–4	6.4–11.1

V_D, volume of distribution at steady state; $t_{1/2}\,\alpha$, redistribution half-life; $t_{1/2}\,\beta$, elimination half-life; CL, clearance.

The success of infusion studies designed to maintain specific plasma levels in gynecologic patients (22) is interesting given the knowledge that in small volunteer studies great variability has been found in the blood level and observed sedative and functional effects of midazolam (26, 27). Plasma levels of 30–50 $\mathrm{ng \cdot mL^{-1}}$ produced a three- to ninefold increase in the sedation index and a 7%–67% prolongation in reaction time (26). This variability in response at a relatively similar blood level means that there are important individual differences in response to midazolam at least when used for low-dose sedation. Of practical significance is the fact that amnesia is not predicted by level of sedation (27); the therapeutic plasma level is lower for amnesia than for sedation.

We have induced general anesthesia with midazolam using computer-assisted continuous infusion (CACI) (28) at plasma levels of approximately 70–250 $\mathrm{ng \cdot mL^{-1}}$. Maintenance of anesthesia can be very effectively achieved at plasma levels of 50–85 $\mathrm{ng \cdot mL^{-1}}$ when a continuous infusion of fentanyl (plasma level 3–8 $\mathrm{ng \cdot mL^{-1}}$) or sufentanil (plasma level of 0.25–2.5 $\mathrm{ng \cdot mL^{-1}}$) is added (Jacobs, unpublished data). These plasma levels are considerably lower than those reported by others (22–25, 29).

Midazolam has been used extensively for continuous infusion to produce sedation postoperatively. The unique pharmacokinetics of midazolam produce differences in awakening time when diazepam and midazolam are compared after repeated sedative dosing in patients following open heart surgery (30). Whereas drug tends to accumulate in the blood with diazepam upon repeated injection for sedation, the level is stable and then rapidly falls in patients treated

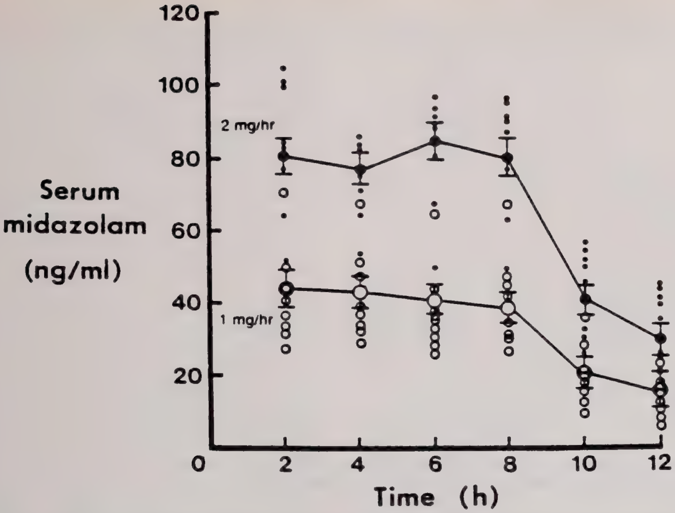

Fig. 2. Serum midazolam concentrations during 8-hr infusion and 4-hr postinfusion. Individual patient midazolam levels during and after a 1 mg/hr (○) or 2 mg/hr (●) infusion. ○ = mean midazolam levels (±SEM) at 1 mg/hr infusion rate; ● = mean values at 2 mg/hr infusion rate. *(Reproduced with permission from ref. 29.)*

with midazolam. The continuous infusion of midazolam has been used successfully for sedation of patients with multiple medical diseases in an intensive care unit (31, 32) (Fig. 2). Unlike continuous infusion of etomidate in this setting, midazolam does not inhibit adrenal function or the release of cortisol.

Multiple-organ-system failure, particularly liver failure, decreases midazolam clearance in ICU patients (25, 31–33). Midazolam infusions designed to maintain plasma levels of 40 $ng \cdot mL^{-1}$ ($1\ mg \cdot hr^{-1}$) or 80 $ng \cdot mL^{-1}$ ($2\ mg \cdot hr^{-1}$) reduce the requirements for morphine and vasoactive drugs in cardiac surgical patients, but significantly prolong intubation. Nevertheless, at the end of 8-hr infusions, the plasma level decreases, so that half the midazolam is gone in 2 hr and patients can be extubated approximately 4 hr after discontinuation of infusion. Pediatric patients sedated with midazolam infusion also have rapid awakening and tend to clear midazolam like adults (25, 33). If midazolam is to be used for continuous infusion for sedation, there is evidence that continuous infusion is superior to intermittent bolus to achieve steady-state levels (34). A plasma level of 50 $ng \cdot mL^{-1}$ is probably adequate. To achieve this level we recommend a loading dose of 0.05 $mg \cdot kg^{-1}$ followed by an infusion of 0.02 $mg \cdot kg^{-1} \cdot hr^{-1}$.

The concept of continuous infusion of midazolam and an opioid (total intravenous anesthesia) needs to be explored further, but preliminary evidence suggests that the use of midazolam as induction and/or maintenance agent with an opioid is a very satisfactory anesthetic technique. Recovery from short operations may be prolonged, but this might be overcome if lower doses of midazolam and opioids are used, or if the infusions are carefully titrated. Further research needs to be done in this field.

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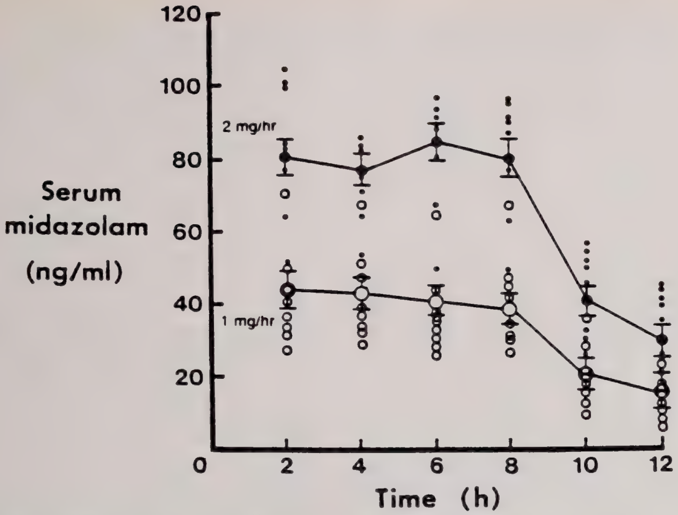

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TABLE 4

Comparison of Techniques Available for the Administration of Intravenous Anesthetic Agents

	Syringe (bolus, multiple boluses)	Infusion pump (bolus + infusion)	Mini-Infuser (Bard) (bolus + infusion)	CACI II (Duke) (model-driven infusion)
Inexpensive	√			
Flexible dosing	√	√	√	√
Established dosing methods	√		√	?
Conceptual appeal				√
Convenient instrumentation	√	√	√	I
User-friendly	√		√	√
Data provided by device				
Cumulative dose (mL)			√	√
Cumulative dose (mg)			√	√
Cumulative dose ($mg \cdot kg^{-1}$)				√
Cumulative volume (mL)	√	√	√	√
Infusion ($mL \cdot hr^{-1}$)		√		√
Infusion rate ($\mu g \cdot kg^{-1} \cdot min^{-1}$)			√	√
Theoretical plasma level				√
Predictive capability				√
Availability	√	√	√	I
Accuracy	√	√	√	?I

?, under investigation; I, will be improved by commercial development.

patient's anesthetic needs are likely to vary throughout the operative procedure.

Among the techniques used to administer intravenous anesthetic agents (Table 4), by far the most common is use of a syringe to deliver bolus injections. In practice, use of this method can range from administration of a single large bolus of fentanyl for induction and maintenance of anesthesia in patients undergoing cardiac operations to multiple miniature boluses of alfentanil during outpatient surgery. The immediacy and technical simplicity of the bolus technique make it very useful and very appealing. However, following each bolus there is a period while the drug level is excessively high and rapidly changing. This may result in the expression of undesirable side effects, and at best this approach offers only coarse control of anesthetic depth; meticulous titration-to-effect is not possible using bolus injections.

To smooth the delivery of some intravenous drugs, administration by continuous infusion is increasingly used. As previously described, alfentanil and midazolam are examples of intravenous anesthetic agents with pharmacokinetic properties making them appropriately suited for administration by continuous infusion. Most anesthesiologists appreciate the pharmacokinetic complexities of continuous infusions and are familiar with the bolus loading technique originated by Wagner (35). Despite its relative elegance, this method requires too many calculations to be practically useful and, moreover, can be readily applied only to a single preset drug plasma concentration per infusion period. It is probably true that most continuous infusion of anesthetic agents are empirically given in the operating room, and though generally effective in the hands of an experienced clinician, it may be that they are not being delivered as efficiently as possible, or as often as desirable, simply because they are so cumbersome and enigmatic to implement.

The Harvard Mini-Infuser (Bard) is a syringe pump device marketed expressly for the administration of alfentanil. It calculates and administers, based on the patient's body weight and the known alfentanil injectate concentration, the proper volumetric flow of alfentanil required to deliver user-specified bolus doses and continuous infusion rates. This "calculator pump" greatly simplifies implementation of titratable alfentanil infusions and represents a major, albeit simplistic, advance in drug delivery technology.

In 1983, Schwilden, Schuttler, and Stoekel (36, 37) proposed and demonstrated the concept of computer-assisted, pharmacokinetic model–driven infusions of intravenous anesthetic agents. They reasoned that if the pharmacokinetics of a drug are known, even approximately, it should be possible to design an infusion paradigm to manipulate the drug plasma concentration with an acceptable degree of accuracy (compared to the desired theoretical level) and efficiency. However, the necessary calculations and infusion rate adjustments are overwhelmingly complex and tedious, and therefore the scheme is best implemented by a computerized infusion device. Several other researchers (38–41) have subsequently explored the merits of the pharmacokinetic model–driven approach to continuous infusions, including an early attempt (CACI I) by our group (28, 42). We have now constructed a second-generation device (CACI II) and are investigating its clinical utility in the administration of fentanyl, sufentanil, alfentanil, midazolam, and propofol.

CACI II consists of a microcomputer (Datavue model 25) which controls one or two drug infusion pumps (Abbott Lifecare model 4) through a digital interface (RS485). The computer keyboard has been customized to facilitate rapid entry of the input required by the system. At the heart of the device is the CACI II software program, which we have written. In using CACI II, the anesthesiologist is prompted to enter the patient's weight, specify the drugs to be infused, and enter the initial setpoint(s) (desired drug plasma or blood concentration). It is assumed that the drug pumps have been primed with drug at a specified concentration. The keyboard is then used to start, stop, restart, and terminate the infusions, and to adjust the setpoint(s) upward or downward as the physician desires and in response to patient needs.

CACI II functions as a model-based control system (Fig. 3). A three-compartment model describing the pharmacokinetics of the drug being infused is simulated in real-time using drug-specific kinetic coefficients (e.g., k_{10}, k_{12}, etc.) derived as average values from the published literature. The output of the model is compared to the setpoint, and the difference is acted on by the infusion algorithm at specified intervals to generate the infusion rate required to achieve the desired drug plasma concentration. The infusion rate is transmitted to the infusion pump, which delivers drug to the patient, and the pharmacokinetic simulation is updated. Obviously, if the theoretical plasma concentration predicted by the simulation is substantially higher than the setpoint, the drug infusion rate is set to zero. If, on the other hand, the predicted level is below or slightly above the setpoint, the infusion algorithm generates infusion rates that are optimally efficient at theoretically maintaining the setpoint, within the limits of patient safety and the electronic and mechanical characteristics of the pump.

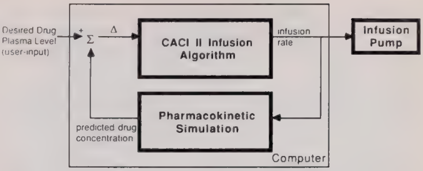
Desired Drug Plasma Level (user-input)
+
Σ
Δ
CACI II Infusion Algorithm
infusion rate
Infusion Pump
Pharmacokinetic Simulation
predicted drug concentration
Computer

Fig. 3. Schematic representation of CACI II, a pharmacokinetic model-driven drug delivery system.

Presented in Table 4 is our assessment of the relative merits of the techniques available to administer intravenous anesthetic agents. Financial considerations aside, the CACI-type instrument offers significant advantages in terms of functional utility and ease of use.

Expense. Electromechanical drug infusion devices are expensive, yet their clinical utility has made them commonplace, especially in critical care settings such as the operating room. In the contemporary health care environment, however, a commercially available CACI-type device will not be accepted if its use is more costly than current modalities. Given the computational power already housed within available drug pumps, very few hardware changes would be required to implement CACI as a modification to existing products. Infusion devices capable of pharmacokinetic model-driven delivery need not be any more costly to acquire or use than presently available infusion pumps, which have been widely embraced.

Dosages. Bolus dosages are well known for many drugs. Continuous infusion methods are novel enough that loading dosages and infusion rates are poorly appreciated for most drugs. The Mini-Infuser is available only for alfentanil, but the bolus dosages and infusion rates appropriate for a variety of circumstances have been well documented and publicized. Computerized pharmacokinetic model-based infusions are based on therapeutic drug plasma concentrations rather than drug dosages. Much work remains to establish Cp50 values. However, in practice, to achieve optimal anesthetic control and hemodynamic stability, it is critical that the plasma concentration be empirically titrated, using the instrument as a tool to help accompish this, to a minimally therapeutic level. This is especially true if it is desired that the patient be awake at the end of the procedure.

Conceptual Appeal. Drug effects do not occur as a result of drug dosages (e.g., mg or $\mu g \cdot kg^{-1} \cdot min^{-1}$). They occur as a result of the concentration of drug at the effector site, which is presumably reflected by the concentration of drug in the blood (ng · mL^{-1}). Therefore, pharmacokinetic model-driven infusions are conceptually very appealing because of their direct concern with drug plasma concentrations. Computerized pharmacokinetically driven infusion devices allow delivery of intravenous anesthetic agents in a manner analogous to use of a calibrated vaporizer to deliver inhalational agents; administration of isoflurane by open mask is certainly not preferable to use of a calibrated isoflurane vaporizer.

User Friendliness. A paucity of dials and alarms and its sheer convenience make the syringe relatively user-friendly. As volumetric delivery devices, the drug infusion pumps presently available are attractive and finely engineered, but they are awkward to use if one is interested in continuous infusions of anesthetic agents. In facilitating rapid implementation of well-established dosing methods, the Mini-Infuser is essentially a user-friendly infusion pump, significantly so because the user is spared at least two sets of calculations. It is also ergonomically pleasing. CACI II provides a user-friendly environment by prompting the user for required input, expediting data entry, and rejecting erroneous and unreasonable entries. Moreover, CACI II does not require its user to make any numerical calculations.

Data Provided. CACI II provides a great deal of dosing data (Table 4). Some of these data are useful for charting purposes, some provide reassurance to the user that the computer-generated dosages are within acceptable limits, and some are of questionable utility.

Predictive Capability. During use of CACI II, the operator can query the system for an answer to the question "If I were to terminate the infusion now, how long would it take for the predicted plasma concentration to drop to a level of x ng · mL^{-1}?" This prognostic capacity has been useful for didactic purposes and may be clinically significant in determining the appropriate time to halt drug infusion.

Accuracy. Taking for granted the electronic and mechanical integrity of available instrumentation, the ability of the syringe, infusion pump, or Mini-Infuser to deliver a specified volume of drug is rarely questioned. In contrast, CACI designs infusion schemes for a particular drug based on average pharmacokinetic parameters that will never exactly match those of the patient receiving the infusion. Thus, the drug levels predicted by CACI only approximate those actually achieved in the blood, and it is the degree to which they are an approximation that is the issue of greatest concern regarding the development of pharmacokinetic model-driven infusion devices. However, pharmacodynamic variability, which is as prevalent as pharmacokinetic variability, assures us that CACI need not be capable of producing absolutely accurate (versus the predicted level) plasma concentrations, as long as the vigilant anesthesiologist is carefully titrating the infusion.

Availability. Pharmacokinetic model-driven infusion devices, CACI II in particular, are not available outside of academic research centers. This prohibits their rigorous evaluation and precludes widespread acceptance at present. Commercial introduction of pharmacokinetically driven devices will put this technology in the hands of practicing clinicians in a variety of environments. Only then will it be possible to assess the clinical utility and efficacy of this concept.

Summary

New drugs like alfentanil and midazolam have the primary advantage of metabolizing faster than existing compounds in their class. Because of shorter plasma half-lives, the drugs are well suited for continuous infusion. In our hands, CACI is a valuable clinical instrument and research tool. Although some anesthetic drugs can be given safely and effectively by bolus injection, whenever a titrated continuous infusion is appropriate (and physiologically closed-loop delivery is not possible), use of a CACI-type instrument should be the preferred method of administration. With the availability for continuous infusion of alfentanil and midazolam, with their highly desirable pharmacodynamic properties and relatively effervescent pharmacokinetics, we believe that computerized pharmacokinetic model-driven infusion devices will play a significant role in future anesthetic practice.

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Dramatic Response of Pulmonary Metastasis from Prostatic Cancer to LH-RH Agonist Treatment

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Abstract

A case is presented of an elderly man with stage D2 cancer of the prostate who responded dramatically to hormonal manipulation utilizing LH-RH agonist. This case has three exceptional features: absence of bone metastasis; massive pulmonary metastasis; and rectal ulceration due to prostatic neoplasm. Although any type of hormonal manipulation could have achieved the same results, the use of LH-RH agonist has distinct advantages: minimal side effects and good patient tolerance.

Case Report. An 84-year-old white man developed acute urinary retention necessitating insertion of an indwelling catheter. He admitted progressive lower tract symptoms including nocturia, frequency, and decrease in size and force of stream over the past year. Persistent watery bowel movements and approximately 25–30 lb weight loss accompanied these symptoms. Significant in the history were arteriosclerotic cardiovascular disease and hypertension controlled with diuretics.

Examination revealed a pale, cachectic man in moderate respiratory distress. Wheezes were audible over both entire lung fields. Rectal examination revealed an enlarged, smooth right prostatic lobe. The left prostatic lobe was indurated, rock hard, with a central cavity penetrating into the rectum. Bimanual examination confirmed the presence of a large pelvic mass involving the seminal vesicals and attached to the bladder base. Pitting edema of both lower extremities was noted.

Laboratory data on admission revealed microhematuria and pyuria. BUN and creatinine were normal, as was SMA-18. Hematocrit was 31. Prostatic acid phosphatase was highly elevated—53 units (normal 0–0.8). Chest x-ray on admission showed multiple bilateral pulmonary nodules consistent with metastatic disease (Fig. 1, left).

Intravenous urogram revealed prompt function bilaterally with normal collecting systems. However, the ureters were tortuous and the distal segments were elevated and displaced anterially. The bladder was also elevated and displaced above the symphysis pubis by a large, soft tissue mass (Fig. 1, middle and right). Cytoscopy was attempted but was unsuccessful owing to a ragged, irregular, tortuous, inflamed prostatic urethra. A perineal prostatic biopsy confirmed the diagnosis of infiltrating prostatic adenocarcinoma with areas of necrosis. A bone scan showed no evidence of metastatic disease.

The cancer was staged as D2. Hormonal manipulation with an LH-RH agonist ([D-ser (t-Bu)] LH-RH nonapeptide ethylamide) was begun with an induction dose of 500 μg given in subcutaneous injections three times a day for one week. The patient tolerated the treatment well and was subsequently discharged with a maintenance dose of 200 μg subcutaneously once a day.

Six weeks later, rectal examination revealed the prostatic mass, as well as the rectal ulceration, to have decreased significantly. The cath-

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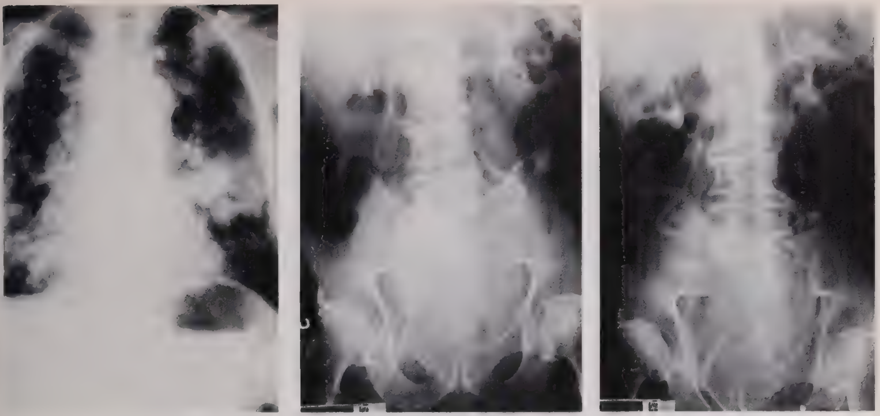

Fig. 1. Status of patient on admission: chest x-ray (**left**), intravenous pyelogram (**middle and right**).

eter was removed and the patient voided with no difficulties. Repeat intravenous urogram at three mo showed marked reduction of the prostatic soft tissue mass and the distal ureteral fish hooking (Fig. 2, left and middle). The prostatic acid phosphatase normalized (0.57 units).

A repeat chest x-ray showed a marked reduction in the size of the metastatic nodules (Fig. 2, right). A bone scan remained normal. Three months later a chest x-ray showed further resolution of the pulmonary nodular disease. The patient is currently 14 mo postdiagnosis, free of pain, and performing his regular activities. He is maintained on daily injections of LH-RH agonist with no side effects. His chest x-ray, although not completely normal, remains essentially unchanged.

Discussion

This case illustrates three unusual manifestations of prostatic cancer: (a) the absence of bone metastasis in the face of diffuse pulmonary metastatic disease, (b) local penetration of the tumor into the rectum, and (c) dramatic response of tumor to LH-RH agonist treatment, as evidenced by the relief of outlet obstruction and the shrinkage of primary disease as well as pulmonary metastases.

The most common form of hematogenous metastasis from prostatic cancer is skeletal. Arnheim (1), in a postmortem study of 176 cases, found that bone and lymph-node involvement accounted for 66% of all metastases. However, he felt this number to be low and accepted a higher figure (75%), as reported by Graves and Millizier (2).

Jacobs (3), in a recent review, claims that 85% of all patients dying of prostatic cancer have skeletal metastases.

These metastases are more common in patients with anaplastic tumors (4). Thus our patient falls into a minority constituting approximately 15% of prostatic cancer patients who do not develop bony metastases after visceral involvement. Of the visceral metastases, pulmonary involvement is the most common and is reported to occur in 25%–38% of all patients dying of prostatic cancer (5). However, clinical recognition of those metastases was achieved in only 6% of all patients prior to their death.

Two types of pulmonary metastasis are recognized: nodular, a type that constitutes approximately 20%, and lymphangitic, which constitutes approximately 80% and carries a grave prognosis. Early recognition of these particular forms and prompt treatment by means of hormonal manipulation will result in a dramatic subjective and objective response, as evident in this case and others (6).

Posterior extension of prostate cancer to involve the rectum is also unusual. Autopsy series report an incidence that varies from 0.56% to 11.5% (7). Three types of rectal involvement are known: rectal ulcer; stricture; and anterior rectal mass.

Frank rectal ulceration, as seen in our case, is rare, being found in only about 1% of cases. The response to hormonal manipulation may be

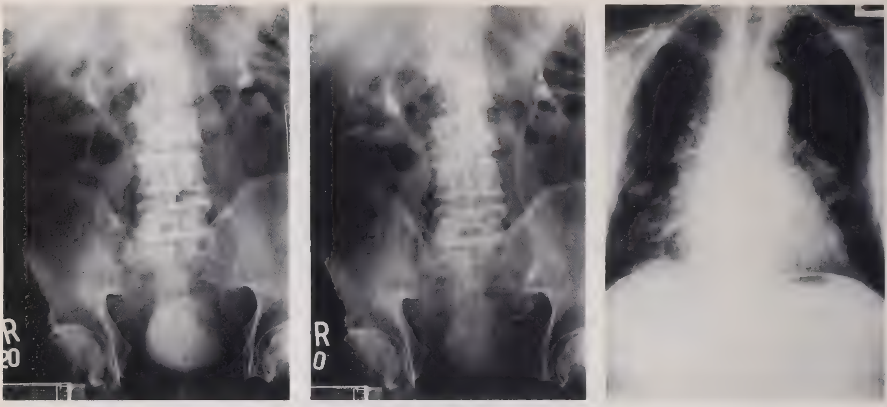

Fig. 2. Status of patient at three months: intravenous pyelogram (**left** and **middle**), chest x-ray (**right**).

dramatic and the ulcer may heal, as in our case. However, the longest survival with this type of rectal involvement is reported to be only 27 mo (8).

The absence of bony metastasis, the rectal ulceration, and the massive pulmonary nodular disease might imply that we are dealing with an unusual type of prostatic cancer—sarcomatous perhaps? However, meticulous review of the pathology slides failed to reveal any unusual pattern, and the dramatic response to LH-RH agonist confirms the clinical nature of this disease. Although we might have reached the same results with the more conventional types of hormonal manipulation—namely, DES or orchidectomy—LH-RH agonist does not produce gynecomastia or adverse cardiovascular side effects such as fluid retention and deep vein thrombosis (9, 10).

A major disadvantage of this drug is its cost (approximately $10 per day of treatment).

Thus the drug appears to be uneconomical in comparison to DES or orchidectomy. It is hoped that the drug will become less expensive in the near future, allowing more patients to benefit from it.

Therefore, we believe this to be a safe, viable option for the treatment of patients with metastatic prostatic cancer. However, the prognosis for these patients, as well as their survival, remains unchanged.

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Axillary Vein Thrombosis as the Initial Symptom in Metastatic Papillary Carcinoma of the Thyroid

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Abstract

A 61-year-old woman developed right axillary vein thrombosis; 30 years earlier she had been surgically treated for papillary carcinoma of the thyroid. Despite intensive treatment she eventually died of disseminated papillary thyroid carcinoma. This appears to be the first reported case of axillary vein thrombosis as the initial symptom of metastatic thyroid carcinoma.

Papillary carcinoma is the most common thyroid malignancy in the United States, accounting for approximately 70% of all thyroid cancer (1). The course of the disease is variable and depends, in part, on age of the patient at diagnosis, sex, size of the primary lesion, presence of local or distant invasion, and type of therapy employed. Distant metastases occurs in 5%–10% of adults during the course of the disease and may involve lung, bone, and soft tissue (1–4). The patient described here developed distant metastases 30 yr after her initial surgery for papillary carcinoma of the thyroid and appears to be the first reported case of metastatic papillary carcinoma of the thyroid gland in which the initial symptom was axillary vein thrombosis.

Case Report. In November 1983, a 61-yr-old white woman consulted a physician for pain, swelling, and prominent subcutaneous veins in the right upper extremity and chest wall of one week's duration.

When she was 32 years old, a 2 × 2 cm solitary nodule of the right lobe of the thyroid gland was discovered. A right hemithyroidectomy was performed in 1954. Pathologic examination showed "papillary carcinoma of the thyroid—Grade I (arising in a papillary adenoma?) with lymphocytic, vascular, and capsular invasion." She was not treated with thyroid hormone but did well until 1958, when a 2 × 2 cm nodule was discovered in the left lobe of the thyroid, and the remainder of the gland was removed. Pathologic diagnosis was "benign nodule." Treatment was started with 3 grains of desiccated thyroid daily and the patient continued the regimen of 2–3 grains daily for the remainder of her life.

In February 1960 a 1.3 × 1.3 cm mass diagnosed pathologically as "hyperplastic cervical lymph node" was excised from the left posterior cervical region, and in June 1963 "hyperplastic cervical lymph nodes" were excised from the left postauricular region. A 2.5 × 2.0 × 1.5 cm left axillary mass was also excised in 1963 and was diagnosed pathologically as an hyperplastic lymph node. In 1973, at the age of 51, her osteoporosis became symptomatic and over the subsequent 10 yr she sustained multiple vertebral and long-bone fractures. She was treated with calcium and a variety of other medications for her osteoporosis. There was no history of radiation therapy to the head or neck.

Examination in 1983 showed a slender, kyphoscoliotic white woman with no palpable neck mass or lymphadenopathy. The right upper extremity was dusky, edematous, and tender, with

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prominent, engorged veins of the hand and forearm. The right anterior chest wall was tender, and prominent venous collaterals and telangectasias were present. All peripheral pulses were palpable, and the abdominal aorta and carotid arteries were normal. The only other remarkable physical finding was skeletal changes associated with advanced osteoporosis. Complete blood count, platelet count, prothrombin time, blood chemistries, and thyroid hormone studies were within normal limits. Chest x-ray showed advanced osteoporosis and kyphoscoliosis but no mediastinal or pulmonary mass. Doppler ultrasonography showed decreased venous flow in the right upper extremity consistent with axillary vein thrombosis. Computerized-tomography scan of the chest showed an area of fullness in the right superior mediastinum extending into the region of the right axilla, with obstruction of the right axillary vein and extensive collateral circulation. The visualized muscles of the right upper extremity and right side of the chest were markedly fuller than on the left side.

Shortly after the patient was hospitalized, she was found to have firm palpable tissue in the right scalene region adjacent to the trachea at the suprasternal notch. On biopsy, the pathologic diagnosis of this tissue was metastatic well-differentiated papillary thyroid carcinoma. Venography showed obstruction of the right axillary vein. She was treated with 200 mCi of iodine 131.

No improvement in the venous findings occurred, and the mass in the right supraclavicular region continued to enlarge. In May 1984, treatment was started with a 5000-rad course of standard radiation therapy to the right neck and mediastinum spread over 25 sessions, along with prednisone, 30 mg daily. Over the next 3 mo there was no response to therapy. The patient became more cachectic and short of breath. In August 1984, she was readmitted to the hospital with pneumonia. She died 3 wk later. Postmortem examination showed papillary carcinoma with squamous features with extensive involvement of the paratracheal region and widespread distant metastases to lymph nodes, lungs, pleura, right chest wall, diaphragm, bone, liver, spleen, kidneys, right breast, and right axillary vein (tumor thrombi). There was no evidence of a hypercoagulable state.

Discussion. Papillary carcinoma of the thyroid is generally considered the least aggressive of the thyroid malignancies. However, its natural history is quite variable. At autopsy, persons dying with no known thyroid disorder have an incidence of occult papillary thyroid carcinoma of about 5.7% (5). Among patients with small primary lesions, the disease typically follows a relatively benign course, even if regional lymph node metastases have occurred. Patients with distant metastases frequently survive for decades. A small percentage of patients, usually those over the age of 40 at the time of diagnosis or those with large primary tumors which extend through the capsule, may have a rapidly fatal course (1, 2, 4–6).

The incidence of postsurgical recurrence of papillary thyroid carcinoma is also quite variable. Among the 576 patients reported by Mazzaferri et al, 70 (12.2%) who were considered to have been free of disease after initial therapy developed a recurrence. Of these, 62 had local recurrence to cervical lymph nodes or thyroid gland, and 8 had distant metastases to lung or bone (1). On the other hand, among 70 fatal cases of papillary thyroid carcinoma reported by Tollefsen et al, 42 had an apparent cancer-free interval and then went on to develop a fatal recurrence. In this series, 28 patients died of uncontrolled locally recurrent papillary carcinoma, 22 died of respiratory insufficiency secondary to pulmonary metastases, 7 died of brain metastases, 7 died of inanition with extensive bone metastases, and 1 died of hepatic metastases. The remaining 5 patients had extensive local invasion plus pulmonary metastases, but a single cause of death could not be identified (3).

A review of 859 patients with papillary thyroid cancer treated at the Mayo Clinic between 1946 and 1970 showed that among postoperative patients whose initial tumors were only intrathyroidal, 146, or 17%, subsequently developed either local or metastatic recurrence. Among this group, those with local tumor recurrence had a 10-yr mortality rate of 17%; among patients with subsequent distant metastatic disease, a 41% 10-yr mortality rate occurred. Among patients with both local and distant metastatic disease, the mortality rate directly attributable to papillary thyroid carcinoma was 58%. In this series, of the patients who died, 36% died of tracheal or esophageal obstruction, 39% died of pulmonary metastases, and 20% died of metastatic invasion of the brain or spinal cord (4).

Before adjunctive therapy (thyroid hormone alone or thyroid hormone plus ^{131}I) was used for postoperative patients with papillary thyroid carcinoma, death rates ranged from 5% to 15.2% (4, 7–10). Since the use of adjunctive therapy, the death rate for papillary thyroid carcinoma has been reduced to as low as 1% (2). As reported by Mazzaferri et al and McConahey et al, age, sex, size of the primary lesion, presence or absence of local and lymph-node involvement, and type of surgical procedure performed also play a role in the recurrence and death rates in patients with papillary thyroid carcinoma (1, 2, 4).

The patient under discussion did receive doses of thyroid hormone that would typically be suppressive, beginning 4 yr after removal of the original lesion. She did not receive postoperative ^{131}I therapy. The effect of the 4-yr hiatus between the initial surgery and the institution of therapy with thyroid hormone on her ultimate outcome is not known, but the death rate among Mazzaferri's patients treated postoperatively with thyroid hormone alone was 0.2%, making the probability of our patient dying of thyroid carcinoma unlikely (2). She was also at low risk of dying of papillary thyroid carcinoma because of her sex and age at the time of the initial diagnosis (1, 2, 4).

This patient is unusual. First, she had one of the longest courses reported among patients whose death was attributable directly to metastatic papillary carcinoma. Second, and most unusual, is the combination of metastatic papillary thyroid carcinoma with classic axillary vein thrombosis which was due to metastatic papillary carcinoma. My review of the literature showed no previously reported cases of papillary thyroid carcinoma causing axillary vein thrombosis.

The majority of axillary vein thromboses have a nonmalignant etiology, including trauma, congestive heart failure, nephrotic syndrome, infection, postoperative scar tissue, and hypercoagulable states. A small percentage of cases are caused by metastatic carcinoma (11, 12). Veal and Hussey reported 18 cases of axillary vein thrombosis due to the mechanical effects of metastatic carcinoma. The sites of the primary lesion included 9 breast carcinomas, 6 bronchogenic carcinomas, 1 lymphosarcoma, 1 sarcoma of the prostate, and 1 sarcoma of the ovary (13). Coon and Willis reported 6 cases of axillary vein thrombosis associated with malignancy. Two were attributed to direct venous compression by large metastatic masses containing lung carcinoma, and 4 to migratory thrombophlebitis associated with the malignant neoplasms (Trousseau syndrome). Of these, 3 had carcinoma of the lung and 1 had polycythemic rubra vera (11).

Benign thyroid disease has been reported to cause axillary vein thrombosis. Klaasen-Udding et al reported 7 patients with large benign multinodular substernal goiters causing right-sided obstruction of the superior vena cava, 4 of whom had thrombosis of the axillary or subclavian vein (14).

Papillary thyroid carcinoma should be added to the list of potential, but rare, causes of axillary vein thrombosis.

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Functioning Lipoadenoma of the Parathyroid: Case Report and Literature Review

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Abstract

Lipoadenoma of the parathyroid gland is a rare histologic variant of parathyroid adenoma that is usually functional and associated with clinical hyperparathyroidism. We report a case in which a radiolabeled thallium scan failed to demonstrate evidence of an adenoma, presumably because of the tumor's high fat content. The literature concerning this entity is reviewed. To our knowledge there are no other reported cases in which parathyroid scanning was used in diagnostic studies of parathyroid lipoadenoma.

Lipoadenoma of the parathyroid is an exceedingly rare entity, only 18 cases of which have been reported to date, most in the pathology literature. We report an additional case that was associated with clinical hyperparathyroidism that resolved after removal of the lesion. Significantly, a preoperative thallium 201 scan with pertechnetate subtraction failed to disclose an adenoma, which would be evidenced by increased uptake of thallium, presumably as a result of the tumor's high fat content.

Case Report

A 59-year-old woman with a history of cranial meningioma and fibrous dysplasia beginning when she was 9 years old consulted a physician because of depression, nausea, and vomiting of two months' duration. During the previous year she had experienced weight loss of 18 lb and had also noted nonspecific pain in the right knee and cervical spine. There was no history of renal stones or peptic ulcer disease. She had a 30 pack-year history of cigarette smoking, and she had received cranial irradiation at the age of approximately 13.

No significant findings were revealed on physical examination other than a cranial defect secondary to the previous craniotomy. The serum calcium level was 2.84 mmol/L (normal, 2.20–2.56 mmol/L), and the N-terminal parathyroid level was 43 ng/L (normal, 8–24 ng/L). Results of other laboratory studies, including intravenous pyelogram and chest x-ray, were within normal limits. A thallium 201 (2 mCi of Tl 201) parathyroid scan using pertechnetate (4 mCi of $^{99}TcO_4$) subtraction showed no abnormal uptake to suggest an adenoma; however, a nonfunctioning area was noted in the lateral aspect of the thyroid gland. Sonogram of the neck revealed enlargement of both the right inferior and superior parathyroid glands that suggested a diagnosis of parathyroid hyperplasia.

The neck was explored through a horizontal incision, and a mass was removed from the left lower parathyroid position. It consisted of a thinly encapsulated ovoid mass of 1.2 × 0.5 × 0.3 cm, weighing 1.0 g. Section of the mass revealed soft, fatty tissue intermixed with smaller areas of firmer brown tissue. The frozen section diagnosis was "enlarged parathyroid weighing

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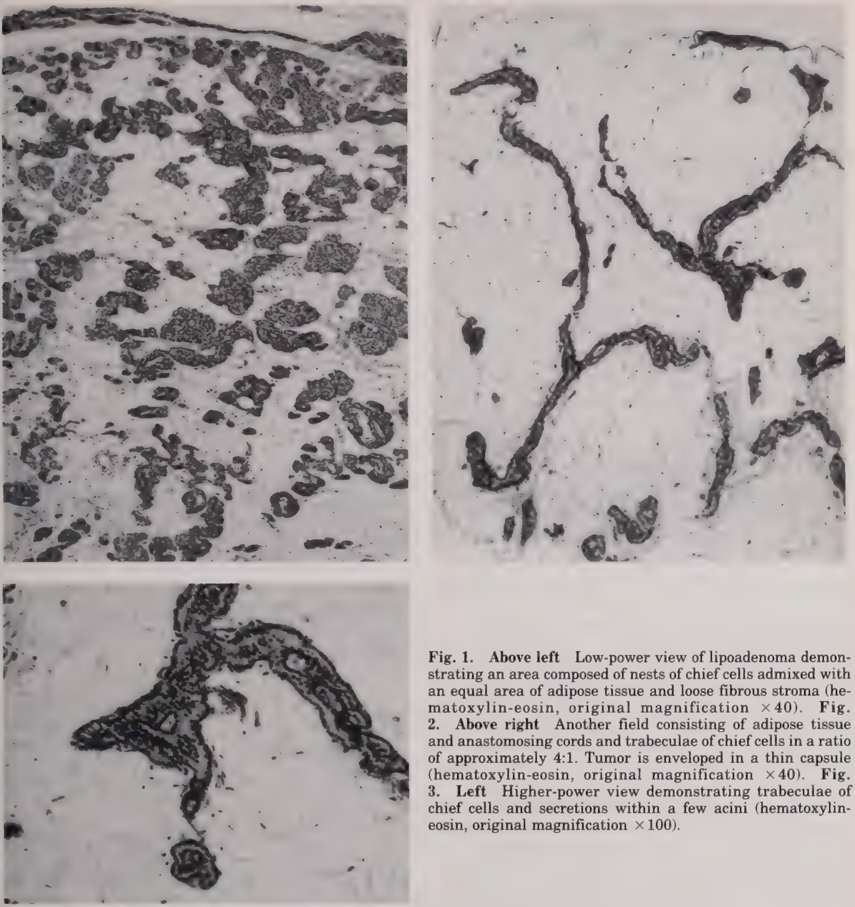

Fig. 1. Above left Low-power view of lipoadenoma demonstrating an area composed of nests of chief cells admixed with an equal area of adipose tissue and loose fibrous stroma (hematoxylin-eosin, original magnification ×40). **Fig. 2. Above right** Another field consisting of adipose tissue and anastomosing cords and trabeculae of chief cells in a ratio of approximately 4:1. Tumor is enveloped in a thin capsule (hematoxylin-eosin, original magnification ×40). **Fig. 3. Left** Higher-power view demonstrating trabeculae of chief cells and secretions within a few acini (hematoxylin-eosin, original magnification ×100).

1.0 g." A second parathyroid gland was removed, which proved to be of normal weight and microscopic appearance.

Microscopic examination of the enlarged gland disclosed a tumor composed of mature adipose tissue admixed with nests (Fig. 1) and anastomosing trabeculae (Figs. 2, 3) of chief cells. The fat content varied from approximately 50% to 80% in different fields. The chief cells exhibited a typical single round central nucleus and slightly eosinophilic cytoplasm. There was no cytologic atypia or mitotic activity. Within some of the acini, dense pink PAS-positive secretions were noted. A small nodule of oncocytic cells was present that also contained adipose tissue, albeit less than the rest of the tumor, as well as a loose fibrous stroma. No adjacent rim of normal parathyroid tissue was found.

The patient had an uneventful postoperative course with no symptoms of hypocalcemia and a return of serum calcium levels to the normal range.

Discussion

Lipoadenoma of the parathyroid gland is a rare entity; only 18 previous cases were disclosed in our review of the literature (1–11). It was first described in 1958 by Ober and Kaiser (1), who designated it a hamartoma and assumed that it was nonfunctional, although calcium and parathyroid hormone levels were not tested. Histologically, however, it was identical to what came to be termed parathyroid lipoadenoma, a designation coined by Abul-Haj et al (2). These authors emphasized the functional nature of the lesion. Since then the frequent functional nature of the lipoadenoma has been confirmed.

Of the total of 18 reported cases, 12 were associated with clinical hypercalcemia, 4 with questionable symptomatology, and 2 were without hypercalcemia. The most common initial symptoms were those of hyperparathyroidism, namely renal stones, bone disease, peptic ulcer, fatigue, and mental confusion. The cases showed no sex predilection, and there was a broad age range of 24–88 yr. The tumors also showed no preference for upper or lower parathyroid regions. They ranged in weight from 15 to 720 g.

In all cases the patients did well following surgical resection of the lesion, and calcium levels that were originally elevated returned to normal. One unusual case was a 190-g parathyroid lipoadenoma in the posterior mediastinum (3); the diagnosis was not suspected preoperatively because of the tumor's unusual location. An additional mediastinal lipoadenoma has been reported arising in a supernumerary parathyroid gland (11).

Both because of the rarity of this entity, and because of the high fat content of the tumor, shared with normal parathyroid glands, the diagnosis of lipoadenoma may present difficulty, as in the case reported here. Histologically there are no universally accepted diagnostic criteria for the entity; however, the high fat content does distinguish lipoadenoma from the more common parathyroid adenoma, which typically contains very little adipose tissue. Lipoadenomas generally are encapsulated, predominantly composed of chief cells arranged in cords and nests separated by a fatty or loose fibrous or myxoid stroma, and occasionally secrete a PAS-positive material. The high fat content of the lesion may also hamper the cutting of adequate frozen sections. Recently Ducatman et al (4) reported making a diagnosis of lipoadenoma by the use of intraoperative touch preparations.

Imaging techniques have met with some success in the diagnosis of parathyroid adenomas. It is generally thought that ultrasound examination provides the best-resolved images for small adenomas (12). Scans with radiolabeled agents have also been employed, using either selenomethionine Se 75 or thallium chloride Tl 201. Both of these require using either ^{99}mTc pertechnetate or sodium iodide I 123 with computerized subtraction, because Tl 201 and Se 75 are taken up by both normal and abnormal thyroid tissue. Robinson (13) reported 75% accuracy in identifying parathyroid hyperplasia or adenoma in 12 patients tested using ^{75}Se, and Ferlin et al (14) showed 92% accuracy in 24 patients, using ^{201}Tl. This result was recently confirmed by one of us (15) in a study in which parathyroid adenomas were correctly identified via preoperative ^{201}Tl scanning in 12 of 13 patients (92%). In the case reported here there was a negative scan, which was probably attributable to the tumor's high fat content.

Accordingly, parathyroid lipoadenoma should be considered when a patient whose clinical picture suggests hyperparathyroidism has a negative radiolabeled parathyroid scan.

In summary, lipoadenoma of the parathyroid is a rare tumor that may pose difficulties in diagnosis that might be avoided through greater familiarity with its radiologic and histologic characteristics.

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Giant-Cell Neoplasm of the Sphenoid Sinus

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Abstract

A rapidly growing giant-cell neoplasm arising in the sphenoid sinus of a 26-year-old man is reported. The patient's only initial symptoms were severe headaches and left sixth-nerve palsy. Computerized tomography of the brain showed extensive tumor infiltration of the bony structures and soft tissues of the base of the skull. A transsphenoidal surgical procedure proved unsuccessful in removing the tumor. Histologic examination revealed a proliferation of osteoclast-type giant cells against a background of highly atypical mononuclear cells, raising the question of malignancy. The differential diagnosis and problems in nomenclature of this lesion are discussed.

Giant-cell neoplasms characterized by a proliferation of osteoclast-type giant cells are rare tumors which have been well documented in the appendicular skeleton and in the soft tissues of the body under a variety of designations (1–4). Such tumors have generally been characterized by their aggressive biologic behavior. Because of their peripheral location they have usually been amenable to total surgical resection. The development of a giant-cell neoplasm in craniofacial or basisphenoid locations is rare. We describe here a case of giant-cell neoplasm arising in the sphenoid sinus of a 26-year-old man in whom the tumor was found at the time of surgery to diffusely infiltrate the surrounding soft tissue, thus rendering it unresectable. The marked histologic atypia and the highly aggressive behavior displayed by this tumor strongly raise the possibility of it being a malignant giant-cell neoplasm. The differential diagnosis and the problems in nomenclature for this tumor are discussed.

Case Report

A 26-year-old Turkish sailor was admitted to Mount Sinai Medical Center (Miami Beach, FL) for evaluation of double vision and left supraorbital pain of 10 days' duration. One week prior to admission he had been seen at a different institution, where a diagnosis of left sixth-nerve palsy had been rendered. There was no history of head trauma.

The only remarkable finding on examination was left proptosis with conjunctival injection and limitation of movement of the left eye past the midline to the left. There were no visual field defects, and the fundi were normal. No other cranial nerve involvement was evident, and the patient was otherwise in perfect health.

CT scan of the brain and orbits revealed an enhancing homogeneous mass involving the sphenoid sinus, with erosion and invasion of the maxillary sinus, disruption of the posterior clinoid and the clivus, and extension into the cavernous sinus (Fig. 1).

A surgical procedure was undertaken in an attempt to remove the mass via a translabial, transsphenoidal approach. A large amount of grayish tumor was found involving the sphenoid sinus and extending anteriorly into the surrounding soft tissues. A debulking procedure was attempted in an effort to remove as much tumor

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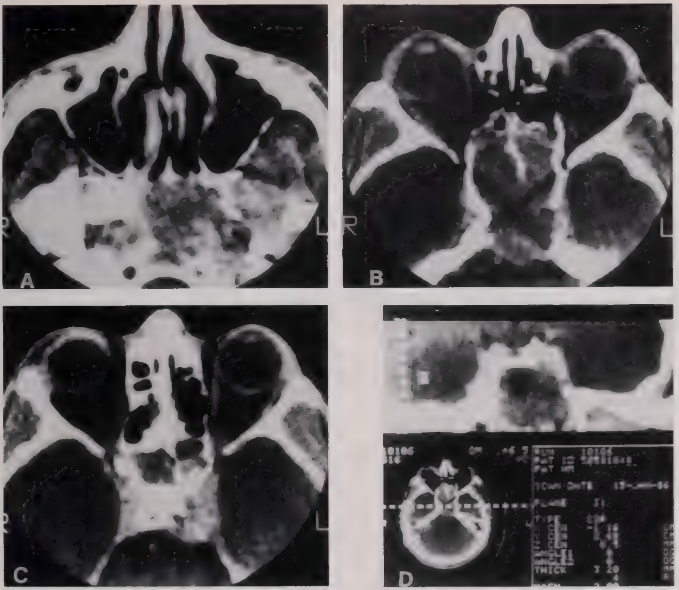


Fig. 1. **(A)** Homogeneous mass is seen in nasopharynx which destroys anterior margin of foramen magnum. **(B)** Massive destruction of sphenoid sinus with extension of tumor mass posteriorly to prepontine cistern. **(C)** Cut through floor of sella shows destruction of posterior aspect of sphenoid sinus with soft tissue extension of tumor into prepontine cistern on left, as well as bulging of cavernous sinus on same side, compatible with direct tumor extension. **(D)** Coronal reformation shows gross destruction and soft tissue invasion in body of sphenoid sinus, with bulging of cavernous sinus due to direct tumor extension.

as possible; however, the extensive infiltration of the tumor into the surrounding structures severely limited the extent of the procedure.

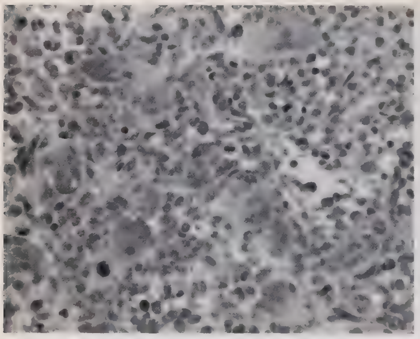
Histologic examination of the tissue removed at surgery revealed a highly cellular neoplasm composed of two distinctive populations of cells: a scattering of numerous large, osteoclast-like multinucleated cells containing more than 15 round, vesicular nuclei per plane of section, and a diffuse, intimately admixed proliferation of mononuclear cells characterized by round-to-oval nuclei and scant eosinophilic cytoplasm (Fig. 2). The nuclei in many of these cells were hyperchromatic and showed prominent nucleoli. There were also numerous mitotic figures which averaged 3–4 per high-power field (Fig. 3).

A battery of immunohistochemical stains utilizing the avidin-biotin complex immunoperoxidase technique was performed. The tumor cells were negative for low-molecular-weight keratin, epithelial membrane antigen, alpha$_1$-antichymotrypsin, desmin, S-100 protein, and glial fibrillary acidic protein, and reacted positively only with vimentin antibodies (Fig. 4).

Postoperatively, the patient was treated with radiation therapy, attaining relief from pain and mild improvement in his neurologic status. The patient returned to Turkey shortly thereafter and has since been lost to follow-up.

Discussion

Giant-cell tumors (osteoclastomas) arising in craniofacial locations are extremely uncommon. Such tumors have been described in the jaws and skull, including the frontal bone (5), temporal bone (6), ethmoid bone (7), and sellar region (8). Giant-cell tumors arising from the sphenoid bone have also been well documented, the majority of cases primarily involving the body of the sphenoid bone and secondarily infiltrating the surrounding soft tissues (9–13). Tumors showing the histologic features of osteoclastomas arising



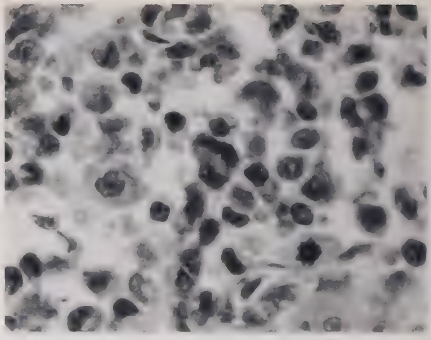


Fig. 2. Left Low-power view showing highly cellular neoplasm composed of proliferation of osteoclast-like giant cells against background of smaller hyperchromatic mononuclear cells (hematoxylin & eosin, ×100). **Fig. 3. Right** Higher-power view of same field showing detail of mononuclear cells, which exhibit hyperchromatic nuclei with irregular outlines and frequent mitotic figures (hematoxylin & eosin, ×400).

from soft tissues in craniofacial locations, on the other hand, have rarely been reported.

We have described here a giant-cell neoplasm bearing the light microscopic features of an osteoclastoma (giant-cell tumor of bone). The exact origin of this tumor could not be determined with certainty, although radiographically it appeared to have originated in the soft tissues of the sphenoid sinus and secondarily invaded adjacent structures. An additional feature of interest in this case was the histologic demonstration of atypia with high mitotic activity in the mononuclear cell component of the lesion. The latter feature raises the possibility that we may have been dealing with a malignant neoplasm.

Benign or Malignant? The problem of categorizing giant-cell tumors as either benign or malignant has been frequently addressed in the literature, particularly on account of reports describing pulmonary metastases in otherwise "benign" giant-cell tumors (14), as well as the locally aggressive behavior exhibited by some of these neoplasms (15, 16).

Morphologic criteria for differentiating between benign and malignant giant-cell tumors have been proposed by Jaffe (17), who described a spectrum of changes primarily involving the mononuclear "stromal" cells and who graded these tumors accordingly. Grade I tumors were those which contained uniformly benign-appearing mononuclear cells in the background and invariably behaved in a benign fashion. Grade III giant-cell tumors contained atypical and frankly malignant mononuclear cells and pursued a malignant course. Grade II giant-cell tumors were intermediate between grades I and III in histopathology and biologic behavior. The value of this grading system, although not universally accepted, has been strongly supported by a number of authors (18, 19).

The histology of the tumor in the present case was consistent with that of a grade III giant-cell tumor in Jaffe's classification. Although adequate follow-up was not available for this patient, the locally aggressive and infiltrative nature of the neoplasm, coupled with the atypical histology, highly suggested a diagnosis of malignancy.

Differential Diagnosis. Another entity that might have been considered in the differential diagnosis in this case was that of a giant-cell reparative granuloma. Although this condition, which has been regarded as a benign, nonneoplastic process linked to trauma and intraosseous hemorrhage, has been thought to be mainly limited to the mandible and maxilla, cases have been reported involving the ethmoid and sphenoid bones (20) and the temporal bone (21). The histologic picture of giant-cell reparative granuloma may closely mimic that of a giant-cell tumor; however, some subtle distinguishing features that enable us to set them apart have been described (21), mainly the clumping of giant cells around foci of hemorrhage; the relatively smaller size of the giant cells, which usually contain fewer nuclei than those in true giant-cell tumors; and the absence of mitotic activity. None of these features were seen in our case.

The finding of a malignant giant-cell neoplasm appearing as a soft tissue mass secondarily invading bone poses an added problem in the histologic differential diagnosis. A tumor that has

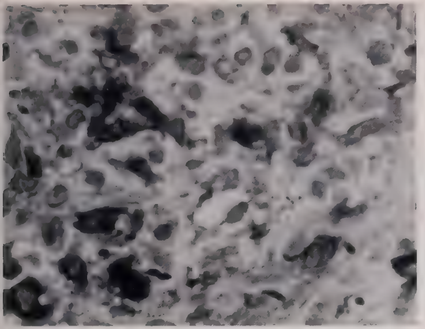


Fig. 4. Immunoperoxidase stain showing focal positive cytoplasmic staining of mononuclear cells with vimentin (ABC, ×600).

been described as bearing features morphologically indistinguishable from those of malignant giant-cell tumors of bone is the malignant fibrous histiocytoma of the giant-cell type (22). This tumor is also characterized by a proliferation of osteoclast-type giant cells against a background of atypical, malignant mononuclear cells, and therefore may be impossible to differentiate on the basis of microscopic appearances alone. The only point of difference between the two may thus lie in their respective locations.

By convention, when such tumors primarily involve bone they have been designated malignant giant-cell tumors of bone, and when found in the soft tissues they have been called malignant fibrous histiocytomas of the giant-cell type. Since, at present, the only reliable criterion for distinguishing between these two entities is their primary site of involvement, difficulties may arise when the exact anatomic point of origin cannot be reliably established, especially when the tumor is discovered at an advanced stage in which infiltration of the adjacent structures has already taken place. We feel that the term "malignant giant-cell neoplasm" is a more adequate designation for these neoplasms under such circumstances.

In summary, we have described a giant-cell neoplasm of the sphenoid sinus bearing histologic features highly suggestive of malignancy. The differential diagnosis for lesions bearing this type of histology rests between a true giant-cell tumor of bone and a rare variant of malignant fibrous histiocytoma. In the present case, despite its apparently predominant soft tissue involvement, it was impossible to determine whether the tumor arose in bone and secondarily invaded the sphenoid sinus and adjacent structures, or whether the converse sequence of events took place. It is our assessment that the differences in terminology between these two entities may be more apparent than real. For this reason, the term "malignant giant-cell neoplasm" is proposed as an alternative to categorize such tumors.

Acknowledgments

This article is dedicated to the memory of the late Arkadi M. Rywlin, whose ideas and teachings largely contributed to this paper.

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Malignant Hyperthermia in a Child with Sleep Apnea

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Abstract

Malignant hyperthermia is a syndrome characterized by a hypermetabolic state of skeletal muscle (1, 2). It is transmitted by genetic inheritance. The syndrome has frequently been associated with certain neuromuscular and other disorders (1, 3). A case of the syndrome occurring in a child with sleep apnea syndrome, an association not previously reported, is discussed here.

Case Report

A 7-year-old, 30-kg black girl came to the hospital for tonsillectomy and adenoidectomy at the day surgery unit. She had a 5-year history of loud snoring and chest retractions during sleep, frequent awakening at night, mouth breathing, daytime somnolence, irritability, and poor school performance. A diagnosis of obstructive sleep apnea was made based on this clinical presentation. Her medical history was otherwise noncontributory. There was no known family history of anesthetic complications in general or of malignant hyperthermia in particular.

Examination revealed a well-nourished girl with moderately enlarged tonsils. The temporomandibular joint was normal. The breath sounds were normal on auscultation. The cardiovascular examination, including EKG, was within normal limits and the hematocrit was 37%.

On admission to the day surgery unit, the patient's axillary temperature was 36.8°C. No premedication was ordered. In the operating room, monitoring was established with an EKG, blood pressure cuff, pulse oximeter, precordial stethoscope, and axillary temperature probe. Anesthesia was induced by an inhalational technique with N_2O/O_2/halothane. Once the patient was unconscious, a significant degree of upper-airway obstruction was noted; it was relieved by anterior subluxation of the temporomandibular joints and positive pressure ventilation by bag and mask. Once intravenous access was obtained, atropine, 0.3 mg, and succinylcholine, 45 mg, were administered intravenously. Thirty seconds later masseter muscle rigidity was noted and the mouth could not be opened despite a great effort. A second anesthesiologist confirmed these findings. The patient was immediately hyperventilated with 100% O_2 by mask using a new Jackson Rees circuit connected to an oxygen tank. Heart rate increased from 115 to 205 bpm. EKG showed a sinus rhythm and the pulse oximeter reading remained at 99%. Axillary temperature increased in the subsequent 10 min from 35.7° (baseline in the operating room) to 36.7°C. The patient was promptly cooled with ice, cold intravenous saline, and a cooling blanket and was allowed to wake up. With an FIO_2 of 1.0 and hyperventilation, a radial arterial blood gas 5 min later showed pH 7.18, pCO_2 53 mmHg, PaO_2 99 mmHg, base excess—9.0 mEq/L, potassium 4.9 mEq/L, and glucose 130 mg/dL (7.21/mmol/L; normal 3.9–6.1 mmol/L). An intravenous bolus of dantrolene, 75 mg, was administered and the operation was cancelled.

On admission to the postanesthesia recovery area, supportive care, including oxygen by face mask, cold intravenous fluids, and continued sur-

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face cooling, was provided. The urine was noted to be red and urinalysis revealed hemoglobinuria and myoglobinuria by the ammonium sulfate precipitation test. During the ensuing 36 hr the patient was treated with intravenous mannitol, furosemide, intermittent dantrolene, and sodium bicarbonate. Although there was no preoperative creatinine kinase (CK) estimation, CK levels rose from 30,000 U/L (normal range up to 145 U/L) on the first postoperative day to a peak of 89,000 U/L on the following day. Over the next two days, the patient complained of severe myalgias.

She was discharged from the hospital four days later in good health and has been rescheduled for elective adenotonsillectomy sometime in the future.

Discussion

This patient with the clinically diagnosed obstructive sleep apnea syndrome had an episode of masseter muscle rigidity upon induction of anesthesia. The syndrome is a recently recognized entity characterized by evidence of airway obstruction during sleep and frequently associated with a variety of neurobehavioral abnormalities (4–7). In children, the most common cause of chronic airway obstruction and sleep-related obstructive phenomena is hypertrophy of the nasopharyngeal lymphoid tissue, specifically the adenoids and tonsils (8–12). Adenotonsillectomy is considered the treatment of choice for obstructive sleep apnea, and the condition is now the most common indication for this procedure (9).

Our patient had a history typical of the syndrome. Other features that may occur are morning headaches, poor growth and development, behavioral abnormalities, and mental retardation. The dominant sign of the syndrome is the loud snoring. Associated cyanosis and bradycardia have also been reported. Long-term complications include pulmonary and systemic hypertension, cardiac hypertrophy, congestive heart failure, and sudden death. Physical examination of the awake patient may reveal mouth breathing and noisy respiration. During sleep, an obstructive pattern of respiration is noted, including retractions, noisy inspiration, and frequent movements (4–12).

The etiology of the syndrome has not been fully clarified, but studies with cinefluoroscopy in children during sleep have shown that the soft palate falls backward against the posterior pharynx, the tongue moves posteriorly, and the lateral walls of the hypopharynx approximate medially during inspiration (13, 14). The child gasps in an effort to overcome the obstruction, arousing partially, loud snoring marking resumption of airflow (13, 15, 16). In children without a history of sleep-related abnormalities, the hypopharynx remains patent during sleep (13).

Other studies using a nasal mask occlusion technique and several pressure transducers in the airway have shown that pharyngeal airway patency in children depends on a favorable balance between airway-dilating and airway-constricting forces (13–16). Negative intraluminal pressure during inspiration has been identified as the major airway-constricting force, whereas the activity of airway muscles appears to be a major dilating force. It has been proposed that temporary imbalances in these forces may account for the periodic pharyngeal closures in the syndrome (13). Applying a load on the airway-dilating muscles by occluding the nasal airway (nasal mask occlusion) just prior to inspiration predisposes the airway to closure by increasing inspiratory suction. Closure of the upper airway during such maneuvers indicates temporary failure of the airway-maintaining mechanisms (17). In animals and human adults and children, evidence exists for a neuromuscular mechanism involving upper-airway dilating muscles which act to counterbalance the collapsing force of negative inspiratory pressure (13–17).

Masseter muscle rigidity is a relatively common transient phenomenon characterized by a dramatic increase in masseter muscle tone and presenting as total resistance to passive opening of the mouth despite great effort (18). Between 40% and 60% of patients with this type of rigidity are reported to be susceptible to malignant hyperthermia on subsequent muscle biopsy testing (19–21), and in the absence of underlying myopathy, a CK value of more than 20,000 IU following masseter muscle rigidity was found to be a positive predictor of susceptibility (21). It has also been reported that patients with malignant hyperthermia often demonstrate localized areas of muscle weakness or musculoskeletal abnormalities that may appear clinically as hypermobile joints, spinal deformities, ptosis, strabismus, clubfoot, and hernias (1, 3).

It is not known what types of surgical procedures are most likely to be associated with masseter muscle rigidity or malignant hyperthermia. Carroll (22), in a recent retrospective survey, reported a 2.8% incidence of the rigidity in children scheduled for strabismus surgery who were anesthetized with halothane and succinylcholine. This was four times greater than in children undergoing other types of surgery (22, 23). In another study of susceptibility to the two conditions in 77 patients, there appeared to be no significant association between masseter muscle rigidity following succinylcholine and type of surgery scheduled. Nevertheless, the occurrence of both obstructive sleep apnea and malignant hyperthermia in our patient raises the possibility that a weakness or imbalance of airway muscle groups, as manifested by the apnea syndrome, may represent another reason to suspect susceptibility to malignant hyperthermia in a pediatric surgical patient.

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Maintenance of Metabolic Alkalosis Despite Saline Administration in the Presence of Ascites

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Abstract

The administration of more than 15 L of saline over 10 days did not correct the metabolic alkalosis (plasma total CO_2 35 mEq/L) of a patient with ascites secondary to ovarian carcinoma. Weight gain was more than 6 kg and urine chloride concentration remained less than 15 mEq/L. The tubular avidity for chloride and sodium which maintains metabolic alkalosis persisted in the face of saline administration, perhaps because of "ineffective" volume expansion.

Metabolic alkalosis is a condition in which a high plasma bicarbonate concentration is usually associated with chloride, sodium, and volume depletion, and the elevated plasma bicarbonate can generally be corrected easily with volume expansion with sodium chloride–containing solutions (1–4). Theoretically, if adequate volume expansion cannot be produced with saline, metabolic alkalosis cannot be corrected (1), but no such case has been described to our knowledge. The present case illustrates the difficulty in correcting metabolic alkalosis in a severe salt-retaining state.

Case Report

A 42-year-old woman was admitted to the hospital for intractable nausea and vomiting, increasing abdominal girth, and 50-lb weight loss. The patient noted increasing abdominal girth for approximately one year. One month prior to admission, severe nausea and vomiting developed. She denied use of any medication.

On admission, blood pressure was 100/60 mmHg, pulse 88/min, and she was afebrile. She appeared chronically ill with poor skin turgor and wasting of her arms, face, and thorax. Lungs were clear to auscultation and percussion. Heart examination disclosed a II/VI systolic murmur at the apex. Her abdomen was massively distended with superficial varicosities. No masses or organomegaly was noted and bowel sounds were normal. Pelvic examination showed retraction of the cervix. Both lower extremities showed 2+ pitting edema to the thighs.

Laboratory examination on admission showed Na 136 mEq/L, K 2.5 mEq/L, Cl 72 mEq/L, total CO_2 49 mEq/L, urea nitrogen 24 mg/dL, glucose 176 mg/100 mL, creatinine 1.1 mg/100 mL, calcium 8.0 mg/100 mL, alkaline phosphatase 108 μ/L (normal 30–110), total bilirubin 0.5 mg/dL, SGPT 13 μ/L, amylase 61 μ/L, total protein 6.0 g/100 mL, albumin 3.1 g/100 mL, magnesium 1.8 mg/dL, WBC 5900, hemoglobin 10.2 g/100 mL, hematocrit 30.9%, arterial blood gas pH 7.59, PCO_2 49 mmHg, PO_2 70 mmHg. Chest x-ray showed normal heart size and clear lung fields. Abdominal sonogram showed a distended abdomen with ascites and a mass extending from liver to pelvis which displaced, but did not invade, the bowel. The kidneys were normal sized and mildly hydronephrotic bilater-

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ally. An upper gastrointestinal series and abdominal CAT scan confirmed the sonographic findings.

During the patient's preoperative course she was given more than 700 mEq of KCl and more than 15 L of normal saline intravenously (Fig.). By day 5, plasma K was 3.6 mEq/L. The patient denied vomiting after day 5 in the hospital. Despite this therapy, on day 10 her plasma total CO_2 was 35 mEq/L with arterial pH 7.51, PCO_2 41 mmHg. On this day urine pH was 8.5 and urine electrolyte concentration was Na 44 mEq/L, K 48 mEq/L, Cl less than 15 mEq/L. (On the Cotlove chloridometer the lowest chloride concentration read accurately is 15 mEq/L. This urine chloride concentration could have been 0–14 mEq/L.)

In the operating room the patient had a central venous catheter placed which, after the administration of 3 units of packed red cells and an additional 3 L of saline, recorded 14 cm H_2O. During the procedure the CVP dropped from 14 to 4 cm H_2O with an estimated loss of 15 L of ascites.

In the recovery room, the patient had repeat urine electrolytes showing Na 157 mEq/L, K 33 mEq/L. Serum electrolytes showed K 4.1 mEq/L, Cl 100 mEq/L, and total CO_2 29 mEq/L. Her weight decreased to 52.3 kg. Pathologic study showed a well-differentiated papillary serous adenocarcinoma which was metastatic. Postoperatively, plasma total CO_2 remained 24–27 mEq/L in the hospital.

The patient had several admissions in the next few months for chemotherapy, nausea, and so forth. Two months before death the patient was admitted with ascites, cachexia, albumin 2.8 g/100 mL, K 2.8 mEq/L, total CO_2 35 mEq/L. Therapy including saline and the use of a Tenkhoff catheter corrected the alkalosis. No autopsy was obtained.

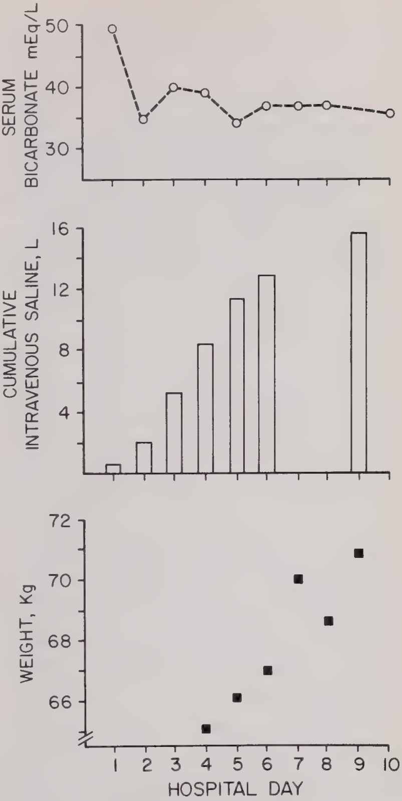

Fig. Daily total CO_2, body weight, and cumulative saline infused.

Discussion

Metabolic alkalosis develops most commonly in patients with loss of gastric fluid or in association with diuretic usage who have a diminished extracellular volume and a total-body deficit of chloride, sodium, and potassium (1–4). In this setting the elevation of plasma bicarbonate is thought to be maintained by volume contraction resulting in tubular avidity for sodium reabsorption, the unavailability of sufficient chloride to be reabsorbed in association with sodium, and the consequent maintenance of hydrogen secretion in large part related to the reabsorption to sodium (1–4). The administration of saline usually results in a rapid fall in plasma bicarbonate concentration because expansion of the extracellular volume with non-bicarbonate-containing solutions dilutes the bicarbonate concentration, diminishes tubular avidity for sodium reabsorption, and thus decreases the stimulus for functional sodium reabsorption in exchange for hydrogen. In addition, chloride becomes available for reabsorption with sodium in the nephron, decreasing sodium for hydrogen exchange. Volume expansion also decreases aldosterone secretion, which may play a role in the maintenance of hydrogen secretion (1).

The present patient was unusual in several respects. She initially had a bicarbonate concentration of 49 mEq/L and a chloride concentration of 72 mEq/L in association with marked ascites and 2+ peripheral edema. Thus, her total extracellular fluid volume was markedly enlarged, although her "effective" extracellular fluid volume may have been decreased. The cause of this severe metabolic alkalosis was presumably persistent vomiting. The administration of 2 L of normal saline decreased plasma bicarbonate concentration to 35 mEq/L, but over the next 9 days, despite the administration of more than 15 L of saline, a normal diet, and sufficient K to elevate plasma K to normal, bicarbonate concentration remained approximately 35 mEq/L (Fig.). During this period body weight increased by 6 kg, indicating the extracellular fluid had increased markedly, predominantly an increase in ascitic fluid. Thus chloride, sodium, and water were retained. The ascites-producing ovarian tumor prevented the saline from producing an effective diuresis of chloride and sodium. Indeed, on day 10 the urine chloride concentration was less than 15 mEq/L, despite an obvious total-body chloride excess. The unavailability of luminal chloride even in the presence of adequate luminal sodium has been shown to increase bicarbonate reabsorption in the collecting duct (6). The ineffectiveness of saline administration in diminishing tubular avidity for sodium and especially chloride in large part prevented the correction of the metabolic alkalosis.

The correction of the metabolic alkalosis postoperatively is of interest. The patient lost a large quantity of ascites containing bicarbonate. The administered saline diluted the remaining extracellular bicarbonate concentration. Alkalosis did not recur in this admission, probably because the stimulus to alkalosis, i.e., vomiting, was not present and the factor maintaining alkalosis, i.e., ascites with "intravascular volume depletion," was absent. The recurrence of alkalosis with ascites later in the course appears to reinforce the concept that the stimulus to producing ascites maintains alkalosis in the face of saline excess, although no more precise data are available from that admisson.

Potassium depletion itself is not generally thought to play a major role in the maintenance of metabolic alkalosis (2–4), but metabolic alkalosis may persist despite adequate quantities of chloride in the urine if potassium depletion is extremely severe (5). In this patient, plasma K was never lower than 2.5 mEq/L and returned to values of 3.5 mEq/L by day 5, despite the persistence of a high plasma bicarbonate concentration and alkaline blood pH (7). Moreover, urine chloride concentration was very low. Thus potassium depletion does not explain the persistence of the alkalosis. Although plasma aldosterone values were not obtained, both the low potassium and the administration of saline should have diminished aldosterone secretion. Moreover, the relatively easy correction of hypokalemia makes severe hyperaldosteronism unlikely. The patient was not hypertensive, and urine chloride concentration was low. Hyperaldosteronism has been reported with malignant sex cord tumors of the ovary (8). We are unaware of an adenocarcinoma of the ovary causing this syndrome. Pathologic examination did not disclose any endocrinelike lesion. Therefore, excessive adrenal hormone production is unlikely to be the major cause of the maintenance of a high plasma bicarbonate concentration.

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Diffuse Neurofibroma of the Pylorus: A Cause of Gastric Outlet Obstruction

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Abstract

We describe a benign diffuse neurofibroma of the pylorus, unassociated with von Recklinghausen's neurofibromatosis, which was a cause of pyloric stenosis; epigastric discomfort, vomiting, and weight loss of 60 lb were the most prominent symptoms. Partial gastrectomy resulted in a cure. The literature on nerve-sheath tumors of the stomach is reviewed.

The classic symptoms of gastric outlet obstruction in an elderly person are most often produced by chronic peptic ulcer disease or a malignancy; other causes of these symptoms are uncommon. We describe an exceedingly rare case in which the cause of gastric outlet obstruction was a diffuse neurofibroma of the pylorus.

Case Report

A 69-year-old black man was hospitalized because of intermittent episodes of postprandial discomfort, nausea, and vomiting of 1½-yr duration, associated with 60 lb weight loss. His history was unremarkable. The patient's parents had died of cardiovascular diseases and his siblings had no medical problems except for hypertension. On admission he was a cachetic male in no acute distress, with blood pressure 80/60 mm Hg, pulse 90/min, and respiration 20/min. The skin showed no discernible lesions. Except for prominent epigastric distension and a chronic venous stasis ulcer of the left leg, general physical and neurologic findings were normal.

Nasogastric intubation yielded large amounts of nonbilious gastric contents with partially digested food particles. Hemoglobin was 6.7 g/dL, hematocrit 23%, white blood cell count 8,400/mm^3, Na 137 mEq/L, K 3.6 mEq/L, Cl 82 mEq/L, CO_2 42 mEq/L, BUN 59 mg/dL, glucose 113 g/dL. Creatinine was 2.3 mg/dL and uric acid 12.0 mg/dL. Liver function findings were normal. Following treatment with intravenous fluids the electrolyte values returned to normal. ECG and chest x-rays were normal. The gastrointestinal tract series showed a near-complete gastric outlet obstruction without evidence of peptic ulcer or tumor (Fig. 1), findings essentially confirmed on gastroscopic examination. A malignant intramural tumor was suspected, but biopsy revealed only normal gastric mucosa. Laparotomy disclosed a firm, ill-defined tumor involving the pylorus, and a subtotal gastrectomy with gastrojejunostomy was carried out, along with an incidental cholecystectomy for gallstones. The postoperative course was uneventful. Two and a half years following the surgery, the patient remained free of any gastrointestinal symptoms and had regained 90 lb.

Pathologic Findings. The partial gastrectomy specimen measured 23 cm along the greater curvature and 10 cm along the lesser curvature. The pyloric wall was markedly thickened (Fig. 2); microscopically, this area contained extensive patchy infiltrates of spindle cells admixed with nerve fibers, fibroblasts, capillaries, and occasional ganglion cells (Fig. 3). Some of the spindle

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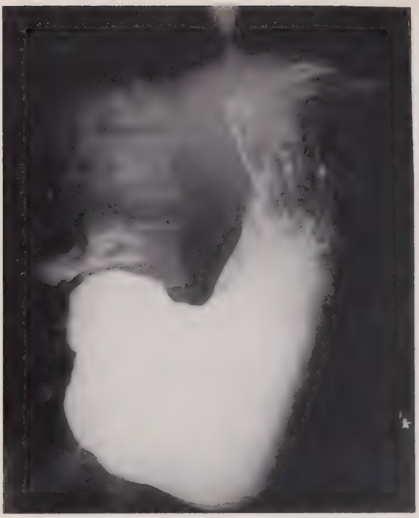


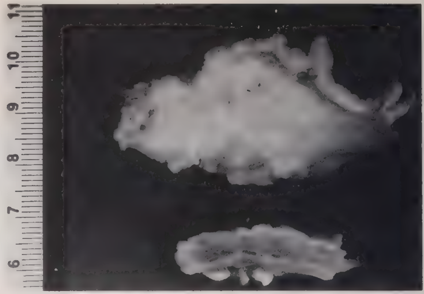


Fig. 1. Left Upper gastrointestinal series with contrast material showing near-complete obstruction of pylorus. **Fig. 2. Above, top** Cross-section of pyloric wall showing ill-defined, irregular mass obscuring normal gross appearance of gastric layer. Mucosa is slightly hyperplastic. Gross impression is of infiltrating gastric carcinoma. Resection edge is on right. **Bottom** Segment of uninvolved gastric wall.

cells were atypical with large hyperchromatic and pleomorphic nuclei (Fig. 3). The tumor extended to the mucosa (which was hyperplastic), but its bulk was within the hypertrophied muscle layers and the submucosa. No necrosis or mitosis was seen. Immunohistochemical staining by the peroxidase method for the S-100 protein was positive in most tumor cells. Electron microscopic examination of the tumor showed spindle-cell groups surrounded by basal lamina (Fig. 4). The cells displayed frequent elongated cytoplasmic projections with many interdigitations. The cytoplasm contained a moderate amount of intermediate filaments, rare neurosecretory-type granules, occasional intermediate intercellular junctions, and some cell surface densities. No pinocytotic vesicles or myofilaments (smooth muscle features) or epithelial differentiation was found.

Based on these findings the diagnosis of a diffuse neurofibroma was made.

Discussion

Neurofibromas of the gastrointestinal (GI) tract occur in 25% of patients with von Recklinghausen's neurofibromatosis (VRN), although only 15% of patients with GI neurofibromas have VRN (1). GI neurofibromas are sometimes discovered incidentally, which suggests their long

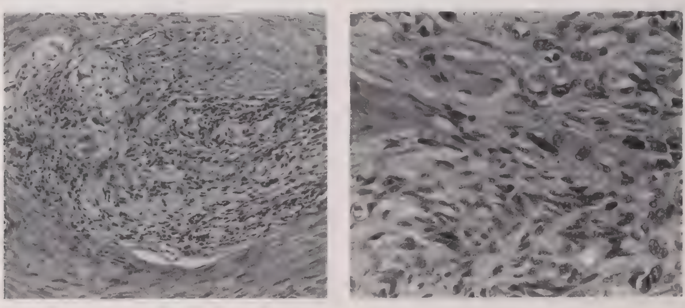
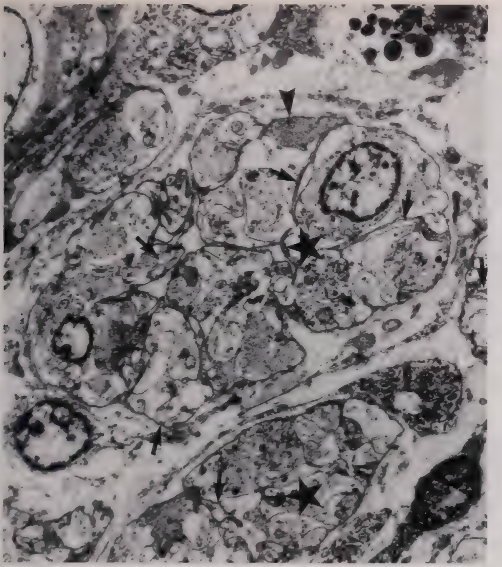


Fig. 3. Left Cellular spindle cell tumor; ganglion cells are seen slightly left of center (hematoxylin-eosin, original magnification ×100). **Right** High power view of tumor showing large, hyperchromatic atypical nuclei (original magnification ×400).



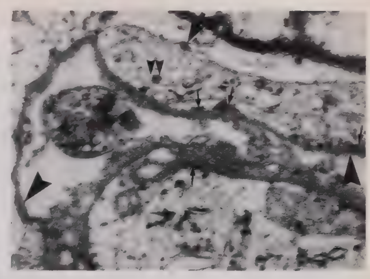


Fig. 4. Left Clusters of neoplastic cells (stars) surrounded by basal lamina (arrowheads) and displaying many interdigitating cytoplasmic projections (arrows). None of the cytoplasmic organelles are particularly abundant. (Uranyl acetate and lead citrate stain; original magnification ×4,060.) **Right** Portions of clusters of neoplastic cells with a deep groove outlined by surrounding basal lamina (large arrowheads). Distal portion of long cytoplasmic projection is noted on upper side of groove. This cytoplasmic projection contains at least one APUD-type granule (double small arrowheads) and also shows an intermediate junction (large arrow) with adjacent neoplastic cell. Occasional cell-surface densities (small arrows) are also noted. Intermediate-type cytoplasmic filaments are scant (×10,570).

asymptomatic clinical course (1, 2). When they are symptomatic, manifestations range from mild abdominal discomfort and anemia to severe or life-threatening GI bleeding or perforation (1, 2).

Neurofibromas of the stomach are rare, especially in patients with VRN (1). Perea and Gregory (3) estimated that neurofibromas constitute 1%–5% of all benign nonepithelial tumors of the stomach. These authors reviewed 29 cases of single or multiple gastric neurofibroma, five of them associated with generalized cutaneous neurofibromatosis. Abdominal pain, anemia, and gastrointestinal bleeding were the most frequent initial symptoms (3). Neurofibromas constitute as much as 10%–15% of all benign nonepithelial gastric tumors in some series (4).

These statistics may be misleading, in our opinion, in view of recent controversies on the histogenesis of GI stromal tumors in general and specifically on differentiation between neural and smooth-muscle neoplasms (5, 6). In cases of VRN the correct presumptive preoperative diagnosis of a gastric tumor can usually be made; these patients may have other neurofibromas, as well as various other characteristic lesions, such as mucosal neuromas, skeletal deformities, CNS tumors (1, 2). But solitary neurofibromas are generally recognized only after histologic examination (2).

Our patient's tumor showed the light-microscopic features of atypical nerve-sheath tumor, and positive S-100 protein immunoperoxidase stain supported this diagnosis. There was no ultrastructural evidence of smooth-muscle differentiation, but clear nerve-sheath tumor features: cell groups with prominent interlocking cytoplasmic cell processes invested by a common basal lamina, intermediate neurofilaments, and occasional membrane-bound granules resembling the typical neurosecretory granules, as described by Carney et al (7). Our patient did not display the characteristic lesions, neurologic manifestations, or other pathophysiologic disorders described in association with VRN or with the syndrome of multiple endocrine neoplasia type 2b, which can be associated with ganglioneuromatosis (7). Careful search in the pedigree of the family tree disclosed no forms of the disease. Radiologically, gastric neurofibromas appear as solitary or multiple well-defined filling defects, usually accompanied by gastritis or mucosal ulceration. Although in many cases preserved peristalsis and elasticity of the wall suggest a benign process (8), radiologic and endoscopic findings may be inconclusive. Malignancy is suspected in other cases and, moreover, the symptoms (bleeding, obstruction) do not respond to medical treatment, necessitating surgical removal.

Neurofibromas may be found anywhere in the stomach, and—like schwannomas or leiomyomas—may either project into the lumen, or grow subserosally, or both (1). Neurofibromas are more frequently found in the body or lesser curvature and nearer the serosa (1), than are leiomyomas, which more often arise in the submucosa (1) and involve the antrum (2). A diffuse intramural neurofibroma of the pylorus, as in our patient, has not to our knowledge been previously described.

Neurofibromas are thought to arise from mature remnants of neural crest derivation arrested in various locations during their migration (8). They may be a monomorphic form of so-called gangliocytic paraganglioma (9), or they may be hamartomatous and hyperplastic (3).

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Computerized Tomography and Magnetic Resonance Imaging in a Case of Spinal Dysraphism

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A patient who has a midline subcutaneous sacral lipomata and lower extremity neurological signs may have other development anomalies in the midline of the back. We recently evaluated such a patient neurologically and with lumbar CT and spinal MRI.

Case Report. The patient was a 25-year-old married woman without children. At her birth, her mother noticed a whitish area over the patient's lower midline sacral back. She consulted us because her mother had noticed that the size of this whitish area, over the sacrum, had increased in diameter rather significantly over the previous two years. There also had been an increase in the amount of hair overlying this whitish area (hypertrichosis). The patient stated that, as a youth, she fell in gym a number of times hitting her back. At those times her legs would become "prickly" and she could not use them for a number of seconds. She did not, however, develop any gait abnormality. She reported that quite often her feet "fall asleep" and she has a "pins and needles" sensation in the lower extremities.

On examination she was able to walk on her heels and toes. Cranial nerves were normal and her optic discs were flat. In the upper extremities, strength was good proximally and distally. Rapid alternating movements of the hands were normal. Triceps and biceps jerks were intact. In the lower extremities, proximal and distal strength was good. Plantar and dorsiflexion of the feet was normal. Knee jerks were +2. The left ankle jerk was absent, and testing by pinprick revealed diminution of sensation on the outer aspect of both lower extremities.

Because of this presentation, a conventional x-ray of the spine was performed and a large spina bifida occulta was noted, from S1 through S3 (Fig. 1). A CAT scan of the lumbar spine showed a widened canal, in the AP diameter, from L1 down to S1. However, the pedicles as well as the lamina were intact. Beginning at S1, there was bilateral absence of the lamina down to S3, resulting in a wide spina bifida (Fig. 2). There was also evidence of extension of the subcutaneous lipoma to the neural canal. In the upper lumbar spine was noted a posterior density in the canal that extended from the top of the scan, initiated at L2, down to S1; the density was round and uniform in diameter throughout its course (Fig. 3). It was felt that this density represented a low-lying spinal cord, that is, tethered cord. Rather than risk injury to the structure via lumbar puncture for myelography, an MRI scan was obtained. This showed that the patient had a low-lying spinal cord, extending down to S1, associated with a spina bifida occulta and subcutaneous lipoma (Fig. 4). The patient subsequently underwent surgical intervention and the tethered cord, as well as a small extension of the lipoma to the neural canal, was documented. The tethered cord was released. The patient tolerated the procedure well.

Discussion. "Spinal dysraphism" refers to all forms of developmental anomalies occurring in the midline of the back; Lichtenstein popularized the term (1). The most frequent of these anoma-

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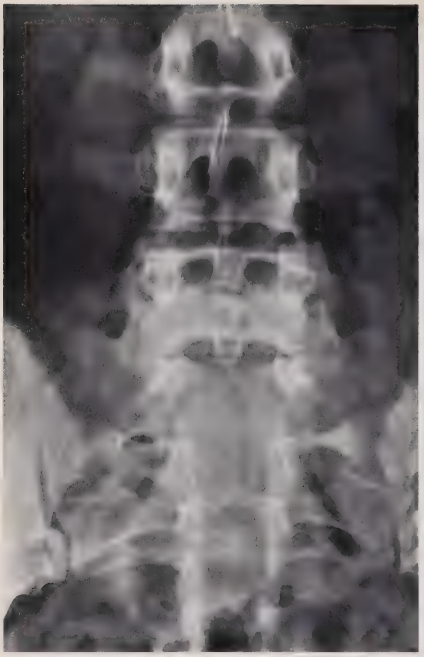

Fig. 1. Conventional AP film of lumbosacral spine shows wide spina bifida beginning at S1 and extending down to bottom of sacrum.

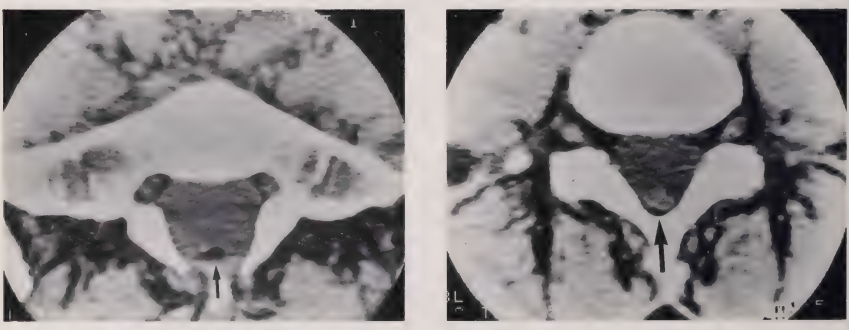

Fig. 2. Left Transaxial cut through S1 shows wide spina bifida with posterior irregular, roundish lucency (arrow). This lucency was noted at surgery to be an extension of sacral lipoma into neural canal. **Fig. 3. Right** CT near L2-L3 disc space shows well-delineated, round posterior density (arrow), extending from beginning of scan at L1 down to S1 area. MRI showed density to be a tethered cord.

lies is absence of a posterior lamina, resulting in spina bifida. The other anomalies described include "tethered cord" with resulting low-lying conus medullarus, diastomyelia with or without an accompanying bony septum, dermoid and epidermoid cysts, either intramedullary or involving the cauda equina. Extension of the subcutaneous lipomata into the neural canal through the spina bifida has also been described. These anomalies result from failure of complete development of the midline primary embryogenic layers.

One of the largest series of spinal dysra-

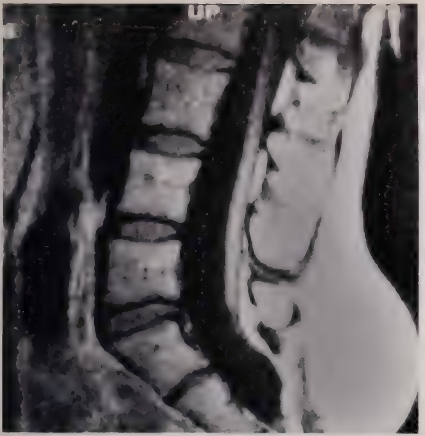

Fig. 4. Saggital magnetic resonance image of lumbosacral spine demonstrating tethered spinal cord extending down to L5-S1 level.

phism was collected by James and Lassman (2) and presented in a monogram encompassing 100 cases. In their series, 26% of the patients with spinal dysraphism had, as part of their presentation, subcutaneous lumbosacral lipoma. Of these, 69% had direct extension of the subcutaneous lipoma into the neural canal. Of their 100 cases, 71% had tethered cord. The tethering was thought to be secondary to fibrous bands which extended from the conus medullarus or the cauda equina through the dura and attached to a lower lying neural arch. These bands were frequently multiple.

Previous reports dealing with CT evaluation of spinal dysraphism (3–5) indicate that anomalies such as a defect of the posterior lamina, sacral or interspinal lipomata, and transverse interspinal septum were easily identified by conventional CT, but that "tethered cord" with a low-lying conus medullarus was far more difficult to identify on conventional CT and requires accompanied contrast injection. However, James and Lassman (2) as well as Taveras and Wood (6) caution that a lumbar myelogram performed on a patient who may have a "tethered cord" could inadvertently injure the spinal cord. In the James and Lassman series, myelography was performed by the introduction of Pantopaque via cisternal puncture. With the introduction of MRI scanning, these complications may be avoided, since the low-lying cord, as well as the other associated anomalies, can be demonstrated.

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An Overview of Fluoxetine, A New Serotonin-Specific Antidepressant

WILLIAM F. BOYER, M.D., AND JOHN P. FEIGHNER, M.D.

Fluoxetine is a new antidepressant recently approved by the FDA for prescription use. It is chemically unique, unrelated to other presently available antidepressants. Many of its properties are similarly unique. In this overview we will highlight the pharmacology, clinical studies, and use of fluoxetine.

Fluoxetine is the first antidepressant in the U.S. from the class of selective serotonin reuptake inhibitors. Most available antidepressants have multiple neurophysiologic effects, including inhibition of synaptic reuptake of norepinephrine and serotonin and affinity for cholinergic, adrenergic, histaminic, and serotonergic receptors. In contrast, fluoxetine's only significant in vivo effect is the inhibition of serotonin reuptake (1, 2).

Fluoxetine is well absorbed after oral administration and develops peak plasma concentrations in 6 to 8 hours. Food slows but does not reduce absorption. It is approximately 94% bound to plasma proteins (3). The EEG effects seen with fluoxetine are similar to activating antidepressants such as desipramine, except after relatively high doses, when it resembles more sedating drugs (4). Its half-life is 1 to 3 days. Its major metabolite, norfluoxetine, is also serotonin-specific and its half-life is 7–15 days. Approximately 65% of a labeled dose of fluoxetine is recovered in the urine and 15% in the feces. Fluoxetine's pharmacokinetics are not significantly altered in the elderly or in patients with renal impairment, but may be prolonged in hepatic failure (2, 5).

Indications and Efficacy

Major Depression. Fluoxetine's efficacy in major depression has been shown in a number of clinical studies (Table). All of these were randomized, five- or six-week double-blind trials in outpatients with major depression. Stark and Hardison reported combined results in five outpatient trials in major depression (6). Five-hundred forty patients were randomly assigned to fluoxetine, imipramine, or placebo. Endpoint analysis showed that both active drugs produced equivalent therapeutic effects (Fig. 1). If positive response is defined as 50% or more improvement on the Hamilton Depression Rating Scale, 63% of the fluoxetine patients responded, compared to 65% of the imipramine and 38% of the placebo patients. These results are similar to the other studies (7–13) summarized in the Table.

Major Depression in Elderly Patients. Elderly patients with major depression pose a special therapeutic challenge because of their greater sensitivity to adverse effects and frequent concomitant illness and medications. Doxepin, which is often prescribed for depressed elderly patients, was compared to fluoxetine in two six-week double-blind trials (13). The results showed equal antidepressant efficacy for both drugs, with fewer total side effects and dropouts among fluoxetine-treated patients. We recently combined this data with that from other fluoxetine trials (14). These patients, all aged 60 or more, were treated in double-blind fashion with fluoxetine (N = 136) or doxepin (N = 87), imipramine (N = 36), or amitriptyline (N = 8). Fluoxetine performed as well as the tricyclic antidepressants in relieving the symptoms of depression and was associated with a lower dropout rate due to adverse effects.

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TABLE
Controlled Fluoxetine Studies

Study	Design	Number of patients	Average daily dose (mg)	Results	Comments
Stark & Hardison (6)	Multi-center 6-wk double-blind	FLX 185 IMI 186 PLA 169	FLX 80 IMI 150	FLX superior to PLA and comparable to IMI on all major efficacy ratings	Significantly fewer FLX than IMI patients dropped out due to adverse effects; FLX associated with statistically significant weight loss
Cohn & Wilcox (7)	6-wk double-blind	FLX 54 IMI 54 PLA 58	FLX 80 IMI 175	FLX significantly superior to PLA and IMI on all major efficacy ratings	More IMI patients dropped out due to adverse effects
Bremner (8)	6-wk double-blind	FLX 16 IMI 20	FLX 60 IMI 175	FLX significantly superior to IMI on all major efficacy ratings	FLX associated with statistically significant weight loss
Masco & Sheetz (9)	6-wk double-blind	FLX 20 AMI 21	FLX 80 AMI 300	FLX not significantly different than AMI on any major efficacy ratings	FLX was associated with weight loss
Feighner (10)	6-wk double-blind	FLX 22 AMI 22	FLX 55 AMI 159	FLX equal or significantly superior to AMI on all major efficacy ratings; more patients discontinued AMI due to adverse effects	FLX was associated with a statistically significant weight loss
Young, Coleman, & Lader (11)	6-wk double-blind	FLX 25 AMI 25	FLX 73 AMI 122	FLX = AMI on Hamilton Scale AMI superior on Beck Inventory	FLX was associated with statistically significant weight loss
Chouinard (12)	6-wk double-blind	FLX 23 AMI 28	FLX 80 AMI 150	AMI superior on Zung scale FLX = AMI on all other major efficacy ratings	FLX was associated with a statistically significant weight loss
Feighner & Cohn (13)	2 6-wk double-blind	FLX 78 DOX 79	FLX 80 DOX 200	FLX = DOX on all efficacy ratings	More DOX patients dropped out due to adverse effects

FLX, fluoxetine; IMI, imipramine; AMI, amitriptyline; DOX, doxepin.

Weight Loss. Fluoxetine has also been investigated for indications other than major depression. Because patients treated with fluoxetine commonly lose weight (Table), Ferguson and Feighner compared fluoxetine with benzphetamine and placebo in a double-blind trial of 150 overweight nondepressed subjects (15). The fluoxetine group lost the largest average amount of weight (10.4 pounds), followed by benzphetamine (8.6 pounds) and placebo (3.6 pounds). The weight loss was most pronounced in the fluoxetine patients who reported carbohydrate craving prior to treatment and was unrelated to whether the patient experienced nausea as a side effect.

Panic Disorder and Obsessive-Compulsive Disorder. Fluoxetine has also been studied in patients with panic disorder (16). Seven of 16 patients in this study had complete cessation of panic attacks. Fluoxetine response was closely related to adverse effects. Eight of the nine nonresponders were unable to tolerate fluoxetine, whereas all of the responders experienced minimal side effects. One open (17) and one single-blind (18) trial have also shown fluoxetine to be promising in obsessive-compulsive disorder.

Adverse Effects

Consistent with its unique chemical structure (Fig. 2), fluoxetine is associated with a distinct pattern of adverse effects, which are usually well tolerated. A measure of this is that early terminations due to adverse effects were more common with tricyclic antidepressants than fluoxetine in several controlled trials (Table). Of the five symptomatic side effects reported by 20% or more of patients in several large trials of fluoxetine versus imipramine or placebo (6) (Fig. 3), only nausea was significantly more common with fluoxetine than the other treatments.

Anticholinergic and cardiovascular side effects are rare with fluoxetine (19). Orthostatic hypotension is uncommon, possibly related to lack of affinity for adrenergic receptors. Fluoxe-

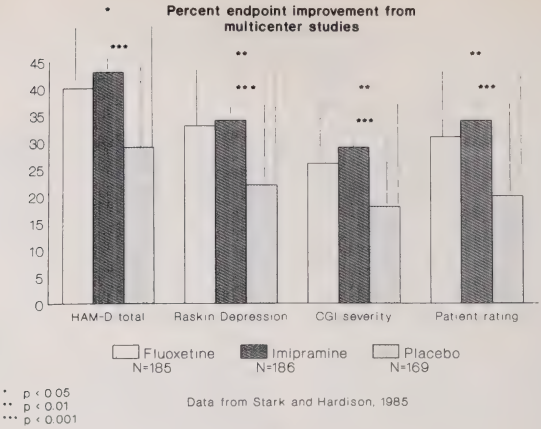

Fig. 1.

tine does not appear to adversely affect the heart's electrical rhythm. Fisch blindly reviewed ECG tracings from the beginning and end of several drug trials in which 312 patients received fluoxetine, 166 received placebo, and 275 were treated with a tricyclic antidepressant. Fluoxetine was not associated with significant ECG changes, but five tricyclic patients developed an intraventricular conduction delay. Tricyclics were associated with increased heart rate but there was a statistically significant average decrease of 3.3 beats per minute with fluoxetine (20).

The most common side effect with fluoxetine is nausea, which is usually mild and tends to subside with continued therapy. Because food does not inhibit absorption, fluoxetine may be taken with meals to minimize gastrointestinal effects. Fluoxetine's other common side effects appear related to its activating properties and include nervousness, insomnia, tremor, and anxiety (19). These symptoms usually respond to dosage reduction or may be treated symptomatically.

Other side effects are much less common. Fluoxetine has not been associated with the serious hypersensitivity reactions which ultimately caused zimelidine, another serotonergic antidepressant, to be removed from the market (19). About 4% of patients develop a rash, which in one-third of cases is severe enough to require drug discontinuation and, in some cases, symptomatic treatment (19). We have also seen three occurrences of lymphadenopathy and painful, swollen joints, especially affecting the hands. These symptoms all resolved with cessation of drug. Like other effective antidepressants, fluoxetine may induce mania, especially in high doses (21). One case of fluoxetine abuse has been reported, in which a depressed patient with undiagnosed anorexia nervosa claimed to experience an antidepressant effect so that she could continue to make use of fluoxetine's appetite-suppressant properties (22).

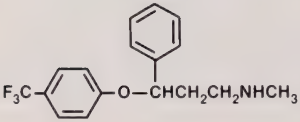

Fig. 2.

There has been limited experience with overdoses of fluoxetine. No deaths have been reported when fluoxetine was the only drug ingested. Fatalities have occurred when fluoxetine was combined with other drugs in overdose. The role, if any, of fluoxetine in the outcome is therefore uncertain.

Clinical Use

The clinical use of fluoxetine is straightforward. Because of its long half-life it may be prescribed for once-a-day use. Another consequence of its half-life is that side effects may be prolonged despite dose reduction. Fluoxetine is often

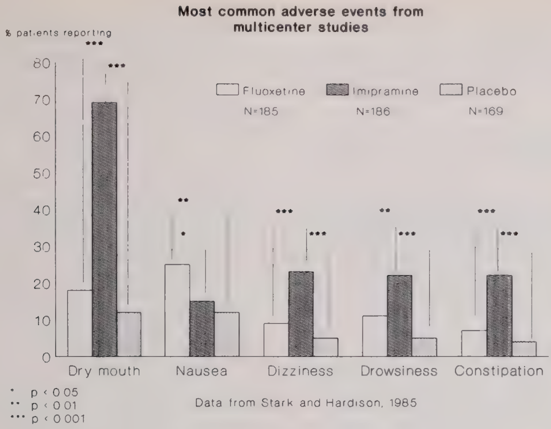

Fig. 3.

prescribed in a morning dose to avoid insomnia, and if a divided schedule is desired, mid-day and late afternoon doses might be added. Preliminary evidence suggests that most patients experience an optimal response with 20 to 40 mg per day (23) and that as little as 5 mg per day may be effective (24). A few patients may require gradual upward dosage titration to 80 mg per day. Therapeutic plasma levels have not been determined for fluoxetine. As with other antidepressants, there may be a delay of 2 to 4 weeks or occasionally longer before a therapeutic effect is seen.

The cost of the drug, which may vary significantly between pharmacies, can be estimated as $39.60/30.

No special diet is required with fluoxetine. As with other psychotropic medication, patients should be warned about the possible consequences of drinking alcohol. Occasional, moderate alcohol use may be allowed for most patients, because fluoxetine does not alter blood ethanol levels and does not potentiate alcohol's effect on physiologic, psychometric, or psychomotor tests (25). The combined use of fluoxetine and a monoamine oxidase inhibitor is contraindicated (26). The combination can produce a severe serotonergic syndrome characterized by hypomania, confusion, irritability, agitation, tremor, myoclonus, flushing, hyperthermia, and diarrhea. A similar but less severe syndrome may occur with concomitant use of l-tryptophan (Feighner JP, Tyler D, Boyer WF, unpublished data).

Fluoxetine, like tricyclic antidepressants, is tightly bound to plasma proteins and therefore the potential exists for interaction with other tightly bound medications, such as digoxin and coumadin. There do not appear to be other significant drug–drug interactions, with the possible exception of increased half-life of desmethyldiazepam (3).

Summary

Fluoxetine is a new, chemically unique antidepressant. In contrast with antidepressants already on the market, its only significant neurophysiologic effect is inhibition of serotonin reuptake. Double-blind comparisons show it is as effective in the treatment of major depression as tricyclic antidepressants. It is free of most of the troubling side effects of currently available antidepressants, including anticholinergic effects and weight gain. In fact, it is commonly associated with weight loss which is independent of nausea, the most commonly reported adverse effect. The recommended dose is 20 mg per day, given in the morning or early in the day. Fluoxetine deserves consideration for depressed patients for whom the clinician wishes to avoid anticholinergic effects, sedation, and weight gain. It may be especially effective in patients with pronounced obsessive-compulsive symptoms, weight gain with depression or from antidepressants, and in patients who have not responded to tricyclic therapy.

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Assessment of Synthetic Media for In Vitro Fertilization

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Studies of human in vitro fertilization (IVF) and embryo transfer (ET) have shown that when investigators have altered protocols to parallel the in vivo system more accurately, significant increases in efficiency have arisen; for instance, providing supplemental in vitro incubation prior to insemination to compensate for the final hours of intrafollicular maturation lost in preovulation retrieval (1, 2). We suggest that because media employed for human IVF and ET have been borrowed from other fields of tissue culture, in which serum was deemed to be the natural fluid to emulate, a thorough examination of present media and culture conditions in terms of "natural environments" may suggest important dissimilarities. It is conceivable that by more accurately approximating the natural environment in vitro, efficiency may be increased.

In vivo the oocyte matures within the follicle to metaphase of the second meiotic division before being ovulated. The oocyte is picked up by the fimbriated portion of the fallopian tube and remains in the ampullary segment for the next 36–84 hr (3–5). Oocyte penetration and fertilization occur within the ampullary portion of the tube. The oocyte remains within the fallopian tube, passing the ampullary-isthmic junction and spending 12–36 hr in the proximal portion of the tube prior to being expelled into the cavity of the uterus. The oocyte undergoes its first cleavage divisions within the isthmic segment of the tube (Fig.).

We review here the three principal environments for the oocyte: intrafollicular, tubal-ampullary, and tubal-isthmic. Functionally, the intrafollicular environment is approximated in vitro by insemination medium (IM), tubal-ampullary by IM, and tubal-isthmic by growth medium (GM). Specimens of synthetic culture media were subjected to analysis and their constitution was compared with known values for the corresponding natural genital tract fluids.

Materials and Methods

Maternal preovulatory serum (MPS) specimens obtained prior to human chorionic gonadotropin injection were collected from 22 consecutive patients attending the Mount Sinai—Chicago IVF program. Following separation, sera were heat-inactivated at 55°C for 30 min and then stored at −10°C until media were formulated.

Modified Ham's F10 medium was prepared from a stock solution as described by Lopata et al (6). Water used was ultrapure high-pressure liquid chromatography grade (Mallinckrodt, Paris, KY). Osmolarity was adjusted to 280 mOsm/L and media were gassed with 5% CO_2, 5% O_2 and 90% N_2 for 20 min and pH adjusted to 7.4. Insemination medium was supplemented with 10% MPS. Growth medium was similarly prepared to contain 20% MPS.

Specimens of Ham's F10 stock solution, MPS, IM, and GM were analyzed via conventional methodology (7–15) (Table 1). The results were compared with known values for follicular and tubal fluids found in the literature.

Results

Analysis of data demonstrates dissimilarities between Ham's F10 and maternal preovula-

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TABLE 1

Concentrations of Selected Compounds in Follicular Fluid and in Media Used for Human In Vitro Fertilization and Embryo Transfer

Substance	Ham's F10 medium[‡]	Insemination medium (IM)[‡]	Growth medium (GM)[‡]	Maternal preovulatory serum[‡]	Reported data on follicular fluid
Na (mEq/L)	141.21 ± 2.06[√]	141.31 ± 1.78[*]	141.28 ± 2.67	138.00 ± 2.88[*√]	124.0 ± 3.2[a] 157.0[c]
K (mEq/L)	4.16 ± 0.14[†√]	4.30 ± 0.26[*]	4.50 ± 0.60[†]	5.32 ± 1.71[*√]	4.4 ± 0.17[a] 6.0[c]
Cl (mEq/L)	120.58 ± 3.93[√]	119.81 ± 3.05[*]	118.20 ± 3.11[!]	103.67 ± 1.99[*!√]	109.0 ± 2.4[a]
HCO3 (mEq/L)	24.58 ± 2.73	24.81 ± 2.55	25.48 ± 2.38	24.27 ± 1.62	
Ca (mM)	0.78 ± 0.22[†√]	0.95 ± 0.19[*]	1.08 ± 0.19[†!]	2.33 ± 0.05[*!√]	
phosphorus (mg/dL)	4.92 ± 0.51[√]	4.92 ± 0.55[*]	4.88 ± 0.60[!]	3.58 ± 0.84[*!√]	
glucose (mg/dL)	106.08 ± 4.62[√]	107.27 ± 6.55[*]	104.36 ± 6.68	91.53 ± 20.04[*√]	
creatinine (mg/dL)	0.11 ± 0.12[†√]	0.11 ± 0.09[*x]	0.24 ± 0.14[†!x]	0.79 ± 0.18[*!√]	
BUN (mg/dL)	1.32 ± 0.87[†√]	2.58 ± 1.17[*x]	4.14 ± 1.41[†!x]	10.95 ± 2.57[*!√]	
total protein (g/dL)	0.29 ± 0.18[†√]	0.96 ± 0.21[*x]	1.68 ± 0.25[†!x]	6.95 ± 0.51[*!√]	5.8 ± 1.0[b]
albumin (g/dL)	0.08 ± 0.10[†√]	0.52 ± 0.10[*x]	1.01 ± 0.11[†!x]	4.65 ± 0.34[*!√]	
No. of samples	24	26	25	15	

[‡] All media prepared following the protocol listed in Lopata et al 1980 (6). IM contains 10% maternal preovulatory serum; GM contains 20% MPS.

[†√*!x] Values with corresponding symbols in each horizontal row are different statistically at the $p < 0.01$ level.

[a,b,c] Follicular fluid data from the literature presented for comparison: [a]Shalgi et al 1972 (16); [b]Edwards 1973 (19); [c]Manarang-Pangan and Menge 1971 (18).

tory serum (MPS) (Table 1). With respect to electrolytes, greater concentrations of Na, Cl, and PO_4 were found in Ham's F10, whereas K and Ca levels were higher in MPS. Factors from MPS including creatinine, BUN, total protein, and albumin not supplied in stock Ham's F10 were by nature higher in MPS. A clear dilutional relationship was shown between levels of these factors and the percentage of MPS in IM and GM.

Discussion

Intrafollicular Environment. Extensive research activity has been focused on characterizing the oocyte's intrafollicular environment. The bulk of these efforts has focused on steroids and complex proteins, factors not directly supplied in the synthetic media. There is, however, a paucity of descriptive information on many other aspects of the preovulatory oocyte.

Shalgi et al (16) were the first to subject human follicular fluid to extensive chemical analysis (Table 1). When compared to ionic levels obtained for maternal preovulatory serum, the concentrations determined for sodium and potassium in follicular fluid were uniformly lower ($p < 0.01$ using one-tailed *t* test). On the other hand, the chloride level of follicular fluid was higher ($p < 0.01$), emphasizing that serum is not the ideal fluid to be emulated in creation of synthetic media.

When contrasted with selected ionic concentrations in follicular fluid, levels of sodium and chloride in IM appeared to be excessive. Better

TABLE 2

Quantification of Components in Natural Tubal Fluid

Element/ Compound	Lippes 1972 (24)		Borland 1980 (25)	David 1973 (26)			Borland 1977 (27)	
	Preovulatory	Postovulatory	All Phases	Proliferative	Ovulation	Secretory	Postestrus Ampullary	Ampullary 0–3 hr P.C.
Na (mEq/L)	140.34 ± 3.4	139.1 ± 1.7	130 ± 5	142.07 ± 4.40	146.10 ± 4.07	148.63 ± 4.65	144 ± 8	121 ± 7
Cl (mEq/L)	119.6 ± 3.6	117.2 ± 3.3	132 ± 6	127.76 ± 19.3	109.44 ± 10.8	112.09 ± 10.9	167 ± 6	142 ± 7
K (mEq/L)	9.9 ± 1.8	7.7 ± 0.9	21.2 ± .24	6.72 ± 1.26	8.61 ± 1.54	6.95 ± 0.48	26.5 ± 5	28.6 ± 2.2
Ca (mM)	1.89 ± 0.5	2.4 ± 0.27	1.13 ± .24				2.6 ± .16	1.9 ± .23
Mg (mM)			1.42 ± .26				1.8 ± .38	1.9 ± .27
S (mM)			12.3 ± 1.9				6.7 ± .95	11.7 ± 1.3
P (mM)			8.69 ± .64				11.2 ± 3.1	15.8 ± 2.4
Total protein (g/dL)	0.1–6.6	3.5–8.6		0.97 ± 0.67	0.80 ± 0.51	1.20 ± 0.39		
Glucose (mg/dL)	54.7 ± 15.0	43.2 ± 9.1						
Source	Human	Human	Human	Human	Human	Human	Murine	Murine
No. of samples	16	16	7	13	9	11	6	12

agreement existed with respect to potassium levels where no significant dissimilarity existed.

In evaluating a variety of other compounds, important differences between follicular fluid and IM continued to be noted. Manarang-Prangan and Menge (18) and Shalgi et al (17) found total protein concentrations of 3.58 and 5.8 g/dL, respectively, in follicular fluid, although in the "normal" laboratory range both values were lower than the mean value of maternal preovulatory serum ($p < 0.01$). In fact, these values differed by nearly a factor of 10 from the level of total protein found in IM (with 10% serum supplement). A gross discrepancy also exists with respect to pH. Shalgi et al (16) found the mean pH of their samples of follicular fluid to be 7.267 ± 0.013. This pH is acidotic in reference to serum and is at least 0.233 unit lower than the pH range proposed by Lopata et al (6) for IM (pH: 7.5–7.6). A possible explanation for these findings could be a high pCO_2 leading to increased formation of carbonic acid, leading, in turn, to a lowering of the pH. Shalgi and coworkers reported, however, a pCO_2 of 35.1, which at a barometric pressure of 760 mm Hg would yield a level of 4.61% CO_2 (a 5% level of CO_2 is invariably used in IVF and ET). Hence, the acidotic pH cannot be ascribed to poor environmental control.

The final principal area of divergence between follicular fluid and IM composition relates to steroids and gonadotropins. Supplementation of IM with these agents is at present not accepted practice. Hence, the only route of entry for these compounds into the in vitro environment is via serum supplementation. Since IM is often composed of 10% serum, concentrations of these agents will at the outset be one-tenth the level found in maternal preovulatory serum. On the basis of data from Wramsby et al (20), oocytes that subsequently went on to cleave had a mean intrafollicular level of [estradiol] = 2111.2 nmol/L, [progesterone] = 22581.2 nmol/L, [FSH] = 1.97 μg/mL, and [LH]/[HCG] = 18.53. The same patients had mean serum levels of [estradiol] = 1720 pmol/L and [progesterone] = 2–7 nmol/L. IM prepared from these sera would have [E2] = 172 pmol/L and [P] = 0.2–0.7 nmol/L. Although unlikely at these concentrations, it is conceivable that the presence of these hormones in maternal preovulatory serum contributes to its fertilization-promoting effects (6, 21, 22).

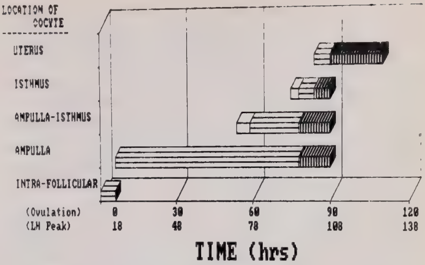

Fig. Diagram of oocyte progression from follicle to uterus. Earliest (white), average (horizontal lines), and latest (vertical lines) times of residence in each location are indicated where data is available (3–5).

TABLE 2
Continued

Borland 1977 (27)		Roblero 1976 (28)	
Ampullary 11–13 hr P.C.	Isthmus 34–36 hr P.C.	Ampulla	Isthmus
139 ± 5	154 ± 5	137 ± 4.8	142 ± 3.4
165 ± 5	160 ± 5	147 ± 4.9	145 ± 6.2
23.4 ± 1.5	25.5 ± 1.8	17.8 ± 1.4	29.7 ± 3.6
1.7 ± 0.1	2.0 ± 0.2	1.6 ± 0.1	1.5 ± 0.1
1.0 ± 0.1	1.1 ± 0.2	0.6 ± 0.1	0.8 ± 0.1
8.5 ± 1.0	14.0 ± 1.4	5.13 ± 0.5	9.1 ± 0.9
8.9 ± 1.1	7.8 ± 1.1	3.90 ± 0.6	8.5 ± 1.8
Murine	Murine	Murine	Murine
22	21	25	17

Assuming accuracy of the results describing the intrafollicular environment of the preovulatory oocyte, it is apparent that important differences exist with regard to ion, protein concentrations, and pH in the synthetic media for preincubation. Recent isolation of proteins unique to follicular fluid (23) suggests that characterization of natural substances operating to aid oocyte maturity may lead to the use of these agents in vitro.

Tubal Fluid. Measurements of the ionic composition of human fallopian tube fluid (HTF) were first made in 1972 by Lippes et al (24). By 1976 electron probe analysis techniques were developed necessitating the recovery of only minute quantities of fluid for analysis. Quantification of total elemental composition (inorganic and organic) was possible with this methodology.

Five studies of basic fallopian tube fluid composition are compared in Table 2 (24–28). Certain trends are apparent that are common to all of the listed studies. First, all of the enumerated values for potassium concentrations are in excess of those found in serum. These higher levels may be explained on the basis of active transport out of the endosalpingeal cells and into the lumen. Alternatively, the oviductal epithelial cells may be highly permeable to potassium, allowing for constant transudation from the vascular bed. This would maintain the transepithelial potential difference with the lumen negative in charge to the serum. The effect of extracellular potassium on intracellular levels (29) and on metabolism and differentiation (30) has been documented in other cell types.

In two studies comparing ovulatory to postovulatory fluid, the concentration of potassium was lower in the postovulatory period. Tantayaporn et al (31) have shown that synergism between estrogen and progesterone can significantly increase the potassium concentration in rat uterine fluid in the preovulatory period. The impact of steroids on tubal secretions is consistent with earlier observations which proved the existence of both estrogen and progesterone receptors in tubal tissue (32, 33).

A common feature of all studies was a higher [K]/[Na] ratio than is found in serum. Again, this can be ascribed to the permeability or active transport characteristics of the tubal cells. The effects on the oocyte have not been well documented. In the murine model it has been shown that diffusion accounts for only 3% of the potassium influx into the unfertilized ovum, whereas nearly half of the sodium influx is via passive processes (34). The long-term effect of the high [K]/[Na] ratio has not been investigated.

The chloride concentration was often reported higher in tubal fluid than serum (25, 27). This observation is consistent with the finding of Brunton and Brinster (35) that chloride is actively transported extracellularly by oviductal tissue to maintain electrical and osmotic gradients. The effect of high chloride levels on the oocyte (Cl is distributed passively across oocyte membranes) has not been investigated (34).

Tubal fluid invariably has a lower calcium concentration than serum (24–28). This may be reflective of the overall lower level of protein present in the tubal fluid. Findings by Lippes et al (24) that calcium concentration is greater in the post- than in the pre-ovulatory period were not confirmed by Borland et al (27) in the murine model. Yanagimachi and Usi (36) have demonstrated the calcium dependence of the acrosome reaction and subsequent activation of spermatozoa.

Finally, the glucose concentration in tubal fluid is essentially one-half the level found in serum (24). This is most likely due to the permeability characteristics of the tubal lumen. It has been demonstrated, however, that glucose is not an essential energy substrate for the oocyte/embryo (37–40).

Electron probe analysis suggested that the magnitude of concentration differences between tubal fluid and serum ions is much greater than early studies indicated. In the human, Borland et al (25) found a potassium concentration of 21.2 mEq/L. This value was greater than 12 mEq/L in excess of the previously documented level of 9.9 mEq/L (24). Chloride was also found to have a far higher level in tubal fluid (132 mEq/L) than thought earlier, but calcium was shown to be at much lower levels in tubal fluid. It is appealing to suggest that since potassium is found primarily intracellularly, the 21.2 mEq/L level resulted either from rupture of red blood cells or via injury to the luminal epithelium. These possibilities were, however, excluded by the investigators (27).

Tubal Microenvironments. The values obtained by Borland et al (25) for ionic components in the human were consistent with those obtained by the same investigators in the murine system. Although the murine studies have not been repeated in the human, they are important since they suggested the existence of distinct microenvironments within the fallopian tube defined both by disparate fluid compositions and by location. They proved that isthmic fluid had greater concentrations of potassium, sulfur, and phosphate than did ampullary fluid ($p = 0.05$). Concentrations of sodium, chloride, and calcium were essentially comparable. Observations also suggested that the protein content of the tubal fluid is greater in the isthmic segments. These observations, dividing the tube by biochemical characteristics, provided hard evidence to substantiate tubal segmentation based on the developmental state of the oocyte/embryo.

Application of the concept of microenvironments is at least tacitly accepted in human IVF and ET protocols, as evidenced by the utilization of both IM and GM to support different phases of in vitro development. Comparing data from Roblero et al (28) for the ampullary tubal fluid (ATF) to IM ionic concentrations, it is evident that the pattern established above is persistent. Insemination medium possessed significantly greater concentrations of sodium ($p < 0.01$) than the ampullary milieu. IM had demonstrably lower levels of chloride ($p < 0.001$), potassium ($p < 0.01$), and calcium ($p < 0.01$) than the tubal ampulla. Examination of these data strongly suggests that the IM currently used by the majority of IVF and ET programs is not physiologic.

The second microenvironment of the fallo-

TABLE 3

Guidelines for Formulation of a More Physiologic Medium for In Vitro Fertilization

	Medium for oocyte preincubation		Medium for oocyte insemination		Medium for embryo development	
Na (mEq/L)	120.0–160.0	(=)*	130.0–140.0	(↓)*	140.0–150.0	(=)†
Cl (mEq/L)	106.0–114.0	(↓)*	130.0–140.0	(↑)*	130.0–140.0	(↑)†
K (mEq/L)	4.0–6.0	(=)*	15.0–25.0	(↑)*	25.0–30.0	(↑)†
Ca (mEq/L)	No data		0.9–1.4	(=)*	0.9–1.4	(=)†
Total protein (g/dL)	3.5–7.0	(↑)*	3.5–8.6	(↑)*	3.5–8.6	(↑)†

* Direction of change with respect to IM.

† Direction of change with respect to GM.

pian tube is the isthmus—the site of early embryo cleavage divisions. Comparing data from Roblero et al (28) for isthmic tubal fluid (ITF) to ionic concentrations determined for GM, the pattern established above appears somewhat altered. Largely because of an increased sodium content in the ITF, essentially no significant concentration gradient exists with respect to GM. The concentration gradient for chloride remained unchanged, with isthmic fluid exceeding synthetic medium by approximately 27 mEq/L ($p < 0.001$). The magnitude of the gradient for potassium increased, while that for calcium decreased. Nonetheless, both were significantly more concentrated in the natural than the synthetic fluids ($p < 0.001$).

Conclusions

Examination of the data presented here suggests that striking dissimilarities exist between the natural fluids of the reproductive tract and the synthetic fluids that have been used to supplant them for human IVF and ET. This finding is not entirely surprising given the evolution of the media currently employed. The simple salt media used in pioneering work in the animal model (Earle's, Kreb's-Ringer Bicarbonate, Tyrode's, etc.) were formulated to parallel ionic levels in serum. Ham's F10 was introduced in 1963 by R. G. Ham (41) after rigorous testing to produce a medium that would yield maximum growth of diploid hamster ovary cells and hamster lung cells for tissue culture. Medium 199, Waymouth's medium, and various others were also developed within the context of mammalian tissue culture experimentation.

Menezo's B2 medium is an exception to this trend. It was formulated to more closely approximate genital tract secretions following early studies suggesting the dissimilarity between these fluids and serum. Menezo's B2 contains significantly greater quantities of potassium- and calcium-containing compounds than Ham's F10 but similar levels of sodium and chloride ions. Published data revealed the following ionic levels: [Na] = 120–130 mM, [K] = 10–12 mM, [Ca] = 1.5–3.0 mM, and [Mg] = 1.0 mM (42). The pH was 7.6 and the medium had an osmolality of 290 mOsm. Menezo's B3 medium has a similar high potassium constitution but is formulated to not require serum supplementation (43). Although we endorse the rationale upon which Menezo's media are based, a cursory comparison with the data cited above indicates that these media still do not closely parallel the most recently defined parameters for natural, tubal fluid.

Recently evidence was presented by Johnston et al (44) confirming the benefit from raising the potassium concentration in Ham's F10 medium. With added K^+ both the fertilization rate (low, [K] = 62.6%; high, [K] = 72.3%) and the pregnancy rate (low, [K] = 7.7%/ET; high [K] = 20.5%/ET) were increased significantly in the human. More dramatically, Roblero and Riffo (45) demonstrated that mouse embryos grown in media containing between 4.7 and 60 mM K had a maximum rate of implantation at 25 mM K.

We hold that this evidence, viewed in conjunction with the preceding discussion, provides sufficient evidence to justify a rethinking of media requirements (see Table 3). This sentiment was confirmed by a recent paper from Quinn et al (46) showing that when media were formulated around the characteristics of human tubal fluid, enhancement of both fertilization and pregnancy rates occurred.

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Mesothelial Papillary Proliferation of the Pleura Associated with Radiation Therapy:

Does It Have a Role in the Pathogenesis of Mesothelioma?

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Abstract

Diffuse papillary proliferation of mesothelial cells in the pleura mimicking metastatic carcinoma was seen four weeks following radiation therapy for a Pancoast tumor. Such papillary proliferations are not observed incidentally and are envisioned to occur during asbestos-induced carcinogenesis. We postulate that similar papillary lesions may serve as a link in the pathogenesis of radiation-induced mesotheliomas.

The effect of radiation therapy on the lung has been studied extensively (1–3). Type II pneumocytic proliferation and atypia, interstitial fibrosis as well as vascular changes have been observed. A very small number of patients have developed lung carcinoma following radiation therapy (4). However, little is known about the effect of radiation on mesothelial cells.

Although there are some reports of mesotheliomas developing several years after therapeutic radiation for Wilms' tumor (5–7), seminoma (8–9), thyroidectomy (8), teratocarcinoma, infiltrating breast carcinoma, and Hodgkin's disease (7), not much is known about the precursor lesions. Mesothelial serosal lining cells of celomic cavities are believed to be the progenitor cells. However, according to Craighead (10), the multipotential subserosal mesenchymal cell is more likely to be the cell giving rise to mesotheliomas. Recently Suzuki et al (11) have shown that both mesothelial and submesothelial cells are the progenitor cells. This concept may help explain the biphasic nature of these tumors.

We describe a case of spindle and epithelial cell proliferation deep in pleura observed four weeks after radiotherapy that simulated both grossly and microscopically metastatic seeding of carcinoma. Such papillary outgrowths of the pleura may also be mistaken for mesothelioma by the unwary pathologist and should be interpreted in the proper context of the history.

Whether this mesothelial reaction can be considered a precursor lesion in radiation-induced carcinogenesis is a matter of speculation.

Case Report. In August 1986 a 66-year-old man consulted a physician for complaints of sharp pain in the left upper extremity for 3–4 weeks, intermittent shortness of breath, nonproductive cough, and 15-pound weight loss over a few weeks. His medical history included chronic bronchitis and heavy cigarette smoking. There was no known asbestos exposure.

Physical examination revealed decreased breath sounds in the left upper lung field with

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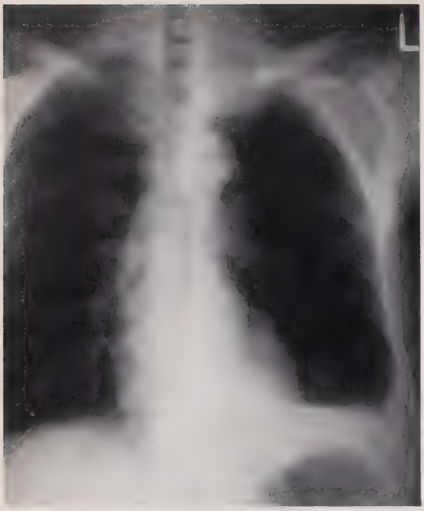


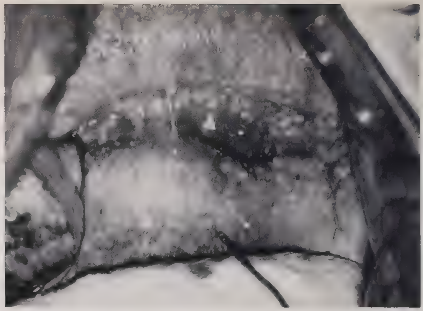


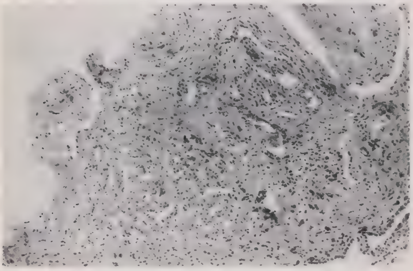
Fig. 1. Left Chest radiograph showing mass in left apex. **Fig. 2. Above** Intraoperative photograph showing multiple tiny nodules (arrows) simulating metastatic carcinoma.

scattered rales. Chest radiograph showed an amorphous 4-cm density at the left apex and blunting of the left costophrenic angle (Fig. 1). Computerized tomography (CT) of the chest revealed a mass in the left apex without evidence of mediastinal lymphadenopathy or pleural disease. CT-directed needle biopsy revealed non-small-cell carcinoma.

The patient subsequently received a course of radiotherapy consisting of 3000 rads. This resulted in relief of pain; however, there was no significant diminution in tumor size on repeat CT scan.

Four weeks later the patient underwent exploratory thoracotomy. Intraoperative findings included a large tumor mass in the left apex adherent to the chest wall, and multiple small 0.5-cm left parietal pleural nodules (Fig. 2).

Frozen-section diagnosis was that of a malignant papillary tumor infiltrating the pleura. Because of this finding, tumor resection was abandoned. Histologically, the permanent section showed papillary outgrowths of the pleura consisting of atypical mesothelial cell hyperplasia with gland formation (Figs. 3, 4). Morphologically, the section was indistinguishable from an epithelial mesothelioma except that the excresences were tiny. Adjacent lung did not show the presence of asbestos bodies or interstitial fibrosis. Electron microscopy of the pleural tissue re-



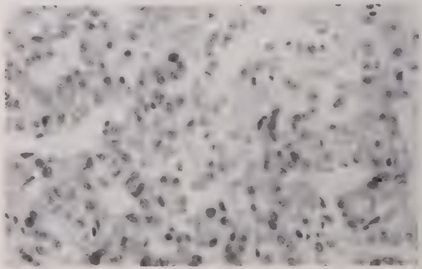


Fig. 3. Left Photomicrograph of papillary lesion of the pleura, low magnification (hematoxylin and eosin stain, original magnification ×100). **Fig. 4. Right** Photomicrograph of papillary lesion, high magnification, showing glandular structures embedded in a collagenous stroma (hematoxylin and eosin stain, original magnification ×400).

vealed dense fibrous tissue with scattered spindle cells and several large cells with abundant clear cytoplasm containing tonofilament bundles. Lumina with striking long microvillus formation were consistent with mesothelial hyperplasia.

The patient's postoperative course was complicated by left upper lobe atelectasis requiring reintubation. Sputum cultures grew *Streptococcus pneumoniae,* and the patient was treated with ampicillin. The patient died approximately one year following the diagnosis of lung carcinoma. No autopsy was obtained.

Discussion. In the case reported here, papillary proliferation of the pleura was observed following radiation therapy for lung carcinoma. Glandular structures embedded in a collagenous stroma were seen. Such proliferation is known to occur in the vicinity of diffuse asbestos-induced mesotheliomas; in rare cases it may precede these mesotheliomas (12). We observed one such case, in which a mesothelioma developed approximately 2 years following biopsy-proven papillary proliferation of the pleura (unpublished observation). Sheldon et al (13) studied 100 unselected autopsies and found insignificant mesothelial hyperplasia. Interestingly, one-third of their patients had pleural plaques, and 17 had ferruginous bodies in the lung tissue. These researchers concluded that significant mesothelial proliferation of the pleura should be followed up.

If these lesions are to be considered precursors, it would appear that mesotheliomas originate in a multicentric fashion. Indeed, gross observation of multinodularity in the early stages of mesotheliomas seems to support this.

However, papillary proliferation of the pleura should be interpreted in the proper context of the patient's history and lesion location. Benign nodular mesothelial hyperplasia of the peritoneum in hernial sacs was reported more than a decade ago by Rosai et al (14). Their patients were mostly children. Morphologically, aggregates of mesothelial cells held together by fibrinous material were observed. A collagenous stroma was not seen. The latter observation would suggest that while some such lesions may progress to mesothelioma, others may not.

Papillary proliferation of the pleura as a result of therapeutic radiation has not to our knowledge been observed. Radiation is notorious in causing pseudomalignant changes in both epithelial and mesenchymal cells. Thus it is not surprising that radiation can produce the same changes in mesothelial cells. However, such changes should have been observed more frequently, given the frequency of radiation therapy.

In experimental animal models (10) the first lesions to develop following asbestos exposure are foreign-body type granulomas which become progressively cellular before becoming malignant. Papillary proliferation of the pleura has not been reported in experimental models.

In the case reported here, the patient died of lung cancer before the progression of the proliferation could be followed up. Mesothelial reactions are poorly understood because rarely does one have the opportunity to study these lesions in a sequential manner. In the absence of such proof, circumstantial evidence should be considered.

Summary. We describe an unusual papillary proliferation of the pleura associated with radiation therapy and speculate on the significance of such lesions in the pathogenesis of radiation-induced mesotheliomas, which is still unclear.

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Student Corner

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Aortic Graft-Enteric Fistula and Paraprosthetic-Enteric Fistula: A Review

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In 1955 Claytor and associates (1) reported the first case of secondary aortoenteric fistula occurring after a previous cloth graft replacement for an aortic aneurysm. This patient died of hemorrhage without surgery being attempted. The first repair of a prosthetic graft-enteric fistula was reported by Gryska (2) in 1957. Since the graft was found to be redundant, the involved portion was resected, and the end reanastomosed. The patient subsequently showed evidence of septic emboli and died of septicemia. Although methods of prevention, diagnosis, and treatment have improved remarkably over the years, secondary aortoenteric fistulas continue to be associated with significantly high morbidity and mortality rates.

Depending on the particular anatomic circumstances, fistulous erosions of the small bowel following graft placement may appear predominantly as either hemorrhage or infection. Sepsis tends to dominate the clinical picture when the bowel contents remained confined to the paragraft space. When the vascular compartment is penetrated by the fistulous complex, gross hemorrhage results. DeWeese and Fry (3) in 1962 first suggested that these two different clinical syndromes reflect two anatomically distinct types of secondary aortoenteric fistulas; this division exists today. Aortic graft-enteric fistula (AGEF) refers strictly to those fistulas that penetrate the aortic lumen. Paraprosthetic-enteric fistula (PPEF), a term introduced by Elliot (4) in 1974, applies to those cases in which an enteric fistula extends only to the outer connective tissue capsule of a prosthesis and therefore lacks direct communication with the lumen of the vascular graft. PPEF accounts for approximately 15%–20% of all fistulous complexes (5). Although AGEF and PPEF may in fact be manifestations of the same pathologic process, in which case the distinction becomes entirely moot with regard to surgical management, it is important to recognize them as distinct entities for diagnostic purposes.

Incidence

The incidence of secondary enteric fistula cited by Elliot (4) in his review of 2,085 cases of abdominal aortic reconstructive operations has been accepted and confirmed by most authors (Table 1) (6, 7). Note that the incidence is greater for resection of an aneurysm than for aortofemoral bypass for occlusive disease. This is not surprising when the anatomic features of these two pathologic entities are considered. It is not uncommon at the time of surgery to find the duodenum tautly stretched over the expanding aneurysmal sac; in such a case the duodenum may already be inherently damaged. Often the bowel is firmly adherent to the sac, so that it becomes technically difficult to remove the aneurysm without injuring the duodenum. Any mishandling of the duodenum may cause ischemic necrosis leading to erosion and fistula formation at a later date (4, 8). Clinically, the progressive increase in the number of bypass operations in recent years has led to an almost equal incidence of AGEF/PPEF following bypass grafting and aneurysmal resection (6, 9).

Wierman et al (10) also found an increased incidence of subsequent AGEF/PPEF with emergency resection for a ruptured aortic aneurysm, intraoperative bowel contamination, or postoperative wound infections. Elliot's data (4) confirmed the increased risk with ruptured aneurysms. These figures illustrate the importance of strict

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asepsis and careful dissection of the bowel during the initial aortic reconstruction in order to reduce the risk of future fistula formation.

Due to anatomic proximity, the fistula most commonly develops between the proximal aortic anastomosis and the distal duodenum; however, any part of the gastrointestinal tract from the stomach to the sigmoid may be involved. Occasionally, the femoral anastomosis is the site of communication with the vascular compartment (Table 2). The time interval from the initial aortic surgery to development of enteric fistula varies considerably, ranging from one week to many years, without any identifiable pattern of distribution (4, 7, 8, 11, 12). Thus, the occurrence of gastrointestinal bleeding in any patient with a history of aortic reconstruction, regardless of the time elapsed since surgery, should raise suspicions that a secondary enteric fistula may be present.

Etiology/Pathogenesis

The propensity of aorta adherent to duodenum to mechanically erode the bowel is illustrated by numerous case reports of primary aortoenteric fistulas since Cooper's original report of just such an event in 1829 (13). However, since the incidence of fistulas after reconstructive aortic surgery is so much greater than the occurrence of primary fistulas, other factors must be involved. Most observers agree that mechanical factors and infection, alone or in combination, are the causative agents.

Mechanical erosion of the bowel may be aided by the formation of dense inflammatory adhesions between the posterior duodenum and the graft. DeWeese and Fry (3) postulated that the prosthetic graft induced a foreign-body inflammatory reaction, with subsequent adhesion and erosion of the bowel. Such an inflammatory reaction could also be caused by a perianastomotic hematoma. Busuttil et al (11) experimentally induced perianastomotic hematomas in 6 dogs, and 2 of them developed fistula between the aorta and duodenum. The continuous pulsations of the aorta, acting on the firmly adherent duodenum, have been suggested to contribute to pressure necrosis of the bowel (14).

Operative trauma to or devascularization of the duodenum during dissection is also important etiologically (15). Purdue (16) noted the inordinate frequency with which conditions potentially predisposing to duodenal injury, such as ruptured aneurysms, multiple operations, or unspecified technical difficulties, occurred in those who later developed fistulas. As noted above, damage to the duodenum can result in ischemic necrosis and erosion of the bowel wall (4, 8).

Once the infection is established, whether by duodenal erosion, intraoperative bowel contamination, or postoperative wound infection, clinical symptoms begin to appear. Inflammatory adhesions may keep the infection localized to the paragraft space, producing systemic manifestations of sepsis. Rarely, the bacteria traverse the interstices of the graft, colonize the internal lining, and result in septic emboli downstream. The most common course is for the infection to dissect along the prosthesis until it involves a suture line. In such cases, anastomotic breakdown invariably results, and a direct communication is established between the bowel and aorta (17).

Primary suture line failure with the development of anastomotic aneurysms may also aid in the development of enteric fistulas. Pseudoaneurysms may result from infection, poor technique, or progressive host-vessel disease. With progres-

TABLE 1

Postoperative Incidence of AGEF/PPEF following Abdominal Aortic Reconstructive Operations

Type of aortic operation	No. of cases	Fistulas No.	(%)
Endarterectomy	162	0	(0)
Aortofemoral bypass	827	2	(0.2)
Resection, unruptured aneurysm	925	7	(0.7)
Resection, ruptured aneurysm	171	3	(1.7)
TOTAL	2085	12	(0.6)

* Adapted from Elliot et al (4).

TABLE 2

Sites of Communication in AGEF/PPEFs

	No.	(%)
Enteric component (107 reported)		
duodenum	78	73
jejunum	14	13
ileum	10	9
sigmoid	2	2
stomach	1	1
colon	1	1
appendix	1	1
Arterial location (73 reported)		
proximal anastomosis	53	73
distal anastomosis	8	11
intact graft (PPEF)	12	16

Adapted from Kiernan et al (5), a 1980 review of all 127 patients with AGEF/PPEF reported in the English-language literature.

sive enlargement a false aneurysm can erode into adjacent bowel, forming a fistula (18). Infection, resulting from either environmental contamination at the time of surgery or intermittent bacteremia, is by far the most common cause of this complication. Busuttil et al (11) illustrate experimentally in dogs that bacteremia following placement of an aortic prosthesis could result in seeding of the graft and subsequent formation of an AGEF. The susceptibility of prosthetic grafts to bacterial seeding, especially up until the time that the pseudointimal lining is complete, was demonstrated by Moore and his associates (19, 20). Although pseudoaneurysms have been found to be associated with AGEFs only about 30% of the time, they may play a significant etiologic role in those cases (7, 22).

Clinical Manifestation

AGEF/PPEF may present primarily as hemorrhage, sepsis, or abdominal pain, or any combination of these features.

Hemorrhage occurs in most cases of a fistulous complex and it can take the form of hematemesis, hematochezia, melana, or chronic anemia with guiac-positive stools. In general, the more mild forms of hemorrhage tend to occur with PPEF and result from bleeding from the bowel wall at the site of erosion by the prosthesis (8, 22). However, at least one case has been reported of a patient with PPEF in hypovolemic shock with massive hemorrhage from the bowel wall (8). With AGEFs severe blood loss is usual and is indicative of a direct communication between the aorta and intestinal lumen. Classically, though, patients experience an initial bleeding episode that is modest and self-limited. Termed the "herald bleed," it portends the severe life-threatening hemorrhage to come. It may represent either bleeding from the bowel wall as it is eroded, or an early small fistula temporarily sealed by thrombin formation and reactive intestinal contraction effecting tamponade (5, 17). A herald hemorrhage was noted by Kleinman and associates (12) in 16/17 patients with AGEF/PPEF who had obvious gastrointestinal hemorrhage; however, others have not reported it to be such a consistent finding (9). Reckless et al (23) reported that 59% survived at least 24 hr after the onset of obvious hemorrhage, but the time interval until the fatal massive bleeding is essentially unpredictable and has ranged from hours to months.

Sepsis may also be evident, often dominating the clinical picture in patients with PPEF. In a review of the literature on PPEFs, O'Mara and Imbembo noted that 66% of the patients initially had manifestations of sepsis (8). Elliot, Smith, and Szilagyi (4) reported 8 patients with PPEF, each with evidence of infection and without overt hemorrhage. Septic fevers were present in 6 patients, septic arthritis in 3, metastatic abscesses in 2, and groin wound abscesses in 2. These 8 patients contrasted sharply with the other 11 in their series who had AGEFs and initially had obvious gastrointestinal bleeding. Perdue et al (16) reported a series of 23 cases of AGEF/PPEF in which 6 had inguinal manifestations of infection in the form of seromas, abscesses, or draining sinuses. Fevers were reported in 16, including a number who initially had overt hemorrhage and were found to have AGEFs at the time of surgery.

Pain in the abdomen or back is not an uncommon feature of aortoenteric fistula. Youmans and Derrick (24) described three patients with PPEF whose initial symptom was primarily abdominal pain, one of whom had occult blood in the stool. The other two had no evidence of bleeding. In another series, abdominal pain, alone or in association with hemorrhage or sepsis, was noted in 53% of the patients (25). In that same group, the pain preceded the onset of hemorrhage in 32%.

A pulsatile abdominal mass may also be present, although it has been reported to be relatively infrequent (16). Kleinman et al, however, did report a palpable mass in 20% (4/20) of their cases (12).

Because the initial symptoms of AGEF/PPEF are markedly varied and encompass hemorrhage, sepsis, and pain, in any degree and any combination, diagnosis requires a high index of suspicion. Any person with a history of aortic reconstructive surgery who develops any combination of pain, sepsis, or blood loss should be assumed to have an AGEF/PPEF until proven otherwise. Without a high index of suspicion, the diagnosis will be missed. Without treatment, the condition is uniformly fatal.

Diagnosis

Until relatively recently, the diagnosis of AGEF/PFEF was most often made at the time of surgical exploration. The rarity of the condition, the modest initial symptoms, and the low yield of various diagnostic procedures all contributed to an inability to make a presumptive preoperative diagnosis.

With the development of new diagnostic procedures such as CT scans, gallium 67 citrate scans, ultrasonography, and endoscopy, and the improved interpretation of more conventional tests such as upper gastrointestinal roentgenography and aortography, it has become possible to diagnose a fistulous complex preoperatively in the vast majority of cases (16, 26–28). Obviously a patient in hypovolemic shock with massive gastrointestinal hemorrhage requires immediate surgical exploration for diagnostic and therapeutic purposes. However, for a patient without obvious bleeding, or one whose bleeding stops and who is hemodynamically stable, diagnostic studies are indicated to rule out other more common causes of hemorrhage that, if found, may eliminate the need for or alter the type of surgical intervention.

CT scan and gallium 67 scan are two new technologies which have been reported to diagnose AGEF/PPEF with remarkable specificity and sensitivity (Table 3). Further testing is required to more accurately identify the limitations of these procedures. The reported sensitivity of several other tests, most notably endoscopy, aortography, and upper gastrointestinal roentgenography, varies greatly from report to report. This discrepancy may be due to differences in the interpretation of the "soft" signs of AGEF/PPEF yielded by these diagnostic modes. Unlike "hard" signs, which unequivocally confirm the diagnosis, "soft" signs are those which, when present in an appropriate clinical setting, are significant enough to make a presumptive diagnosis (Table 4). The lower specificity of "soft" signs again underscores the importance of a high index of suspicion. Without an initial suspicion, the "soft" signs will be either overlooked or unappreciated.

The first step in diagnosing a fistulous complex should probably be endoscopy. In addition to potentially establishing the diagnosis, endoscopy helps to rule out other more common causes of hemorrhage. Peptic ulceration, which has been noted to occur with increased frequency in patients who have undergone aortic reconstruction, can produce initial symptoms strikingly similar to those of a fistula (29). The examiner must be careful, however, not to incorrectly identify proximal abnormality as the source of the patient's bleeding, and thus curtail an incomplete examination (16). Visualization of the third and fourth portions of the duodenum is mandatory in patients at risk for a fistula, regardless of what is found in the stomach or proximal duodenum.

At this point, some authors recommend proceeding with aortography (22, 26). In addition to establishing the diagnosis in approximately 35% of patients, aortography may be useful in planning operative procedures by visualizing the proximal aortic anastomosis, demonstrating the presence or absence of a false aneurysm, and delineating the distal runoff (7). Others argue that since the yield of gallium 67 citrate scans and CT scans has been reported to be so much higher, one of these tests should be performed in those cases in which a high clinical suspicion exists and endoscopy has been negative or equivocal (6, 16). Several physicians have also noted the diagnostic capabilities of femoral artery blood cultures. Rosenthal et al (30) reported that femoral cultures

TABLE 3

Reported Sensitivities of Various Diagnostic Tests for AGEF/PPEF (No. of Positive Tests/No. of Tests)

	UGI	ATGY	ENDO	SONO	BE	CT	GA 67	CULT	SINO
Buchbinder (31)		0/10	0/10						
Busuttil (11)		1/3	2/6						
Champion (9)	1/?*	*	8/11						
Gregson (32)	6/6	1/1	0/2	2/2		1/1			
Jackson (26)	4/7	6/11	1/?*	0/1	1/6				
Klienman (12)	1/10	2/6	1/6		0/3				
O'Donnell (7)	5/7	3/9	4/11					8/13	
O'Mara (22)	3/6	6/7	2/8						1/1
Perdue (16)	1/13	6/18	3/8	0/3		4/4	5/5	?/?†	2/2
Rosenthal (30)	1/3	0/6	1/7	0/2				6/7	
Ackroyd (33)						3/3			
Haaga (27)						4/4			
Causey (28)							5/5		
TOTAL	21/52	25/71	21/69	2/8	1/9	12/12	10/10	14/20	3/3
% POSITIVE	40%	35%	30%	25%	11%	100%	100%	70%	100%

UGI, upper gastrointestinal series; ATGY, aortography; ENDO, endoscopy; SONO, ultrasonography; BE, barium enema; GA 67, gallium 67 citrate scan; CULT, blood cultures; SINO, groin sinography.

* Reported one positive test but no sensitivity given.

† Reported several positive results but no sensitivity given.

TABLE 4
Diagnostic Signs for AGEF/PPEF Found by Various Tests

Test (reference)	Hard signs	Soft signs
Endoscopy (7, 9, 34, 35, 36)	1. visualize graft/bile stained structure in lumen	1. arterial bleeding in 2nd or 3rd portion of duodenum 2. extrinsic pulsatile mass 3. punctate ulcer in 3rd part of duodenum 4. petechiae in 3rd part of duodenum
Upper GI series (14, 22, 26, 32)	1. extravasation of contrast out of bowel outlining graft ("coiled spring" sign)	1. loss of mucosal folds/mucosal irregularity 2. ulcer crater with unusual appearance or location 3. rounded filling defect in 3rd part of duodenum 4. presence of extrinsic mass compressing bowel wall/partial obstruction 5. bowel displacement
Aortography (14, 22, 26)	1. extravasation of contrast out of aorta into bowel	1. false aneurysm 2. peculiar fistula 3. bowing of graft (indicative of graft redundancy) 4. graft occlusion/thrombosis
Blood cultures (7, 30)	1. positive cultures for enteric organisms	
CT scan (27, 28, 33, 37)	1. intraluminal aortic gas 2. extravasation of oral contrast around graft 3. soft tissue mass adjacent to graft	
Ga 67 scan (16, 28)	1. increased uptake at site of impending intestinal erosion or of PPEF (prosthetic graft does not pick up isotope unless involved in inflammation)	

were positive for enteric organisms identical to those found intraoperatively at the site of the fistula in 6/7 patients. When combined with O'Donnell's series (7), cultures were diagnostic in 70% of the cases.

Sonograms have not proven to be a useful tool in diagnosing fistulas. Other imaging techniques, such as the CT scan, provide a much more reliable and accurate assessment. Although barium enemas only rarely confirm the diagnosis, they can be useful in ruling out other causes of bleeding, such as cancer or diverticular disease. In patients with fistulous complex manifested by draining inguinal sinuses, groin sinography has proven to be a highly accurate tool (3/3 patients) for making the diagnosis (16, 22).

Management

Successful management requires early recognition and emergency surgery. An unrecognized fistulous complex is invariably fatal (21). Kleinman et al (12) also noted that the timing of operative intervention differed considerably between survivors (2.2 ± 1.2 days) and nonsurvivors (12.4 ± 3.8 days). The hallmark of surgical treatment is complete graft excision and revascularization of the lower extremities by immediate axillobifemoral bypass grafting. In his 1983 review of the literature, Bunt (21) noted a 38% mortality rate associated with this form of management. Other forms of treatment, including graft excision with in situ revascularization and attempts at local repair, were reported to be much less effective (Table 5).

Despite previous reports (4, 15, 38), the presence of infection throughout the retroperitoneal tissues must be assumed in all cases, even in the absence of gross purulence or identifiable organisms on gram stain (11, 12, 16, 17, 22). This smoldering infection renders attempts at local repair or in situ revascularization inadvisable. When these approaches are tried, refistulization is common, resulting in significant morbidity and mortality.

Extraanatomic bypass provides the only means of revascularization that places the prosthesis outside the site of infection. It should be the only method employed to reestablish blood flow to the lower extremities. This contrasts sharply with the suggested treatment for primary aortoenteric fistulas. In situ placement of a

TABLE 5
Mortality Rates associated with Surgical Approaches to AGEF/PPEF

Type of surgery	Mortality No.	(%)
No treatment, laparotomy only	60/60	(100)
Local treatment/laparotomy	55/62	(88)
Graft excision, no revascularization	17/22	(74)
Graft excision with in situ revascularization	37/66	(56)
Graft excision with extraanatomic bypass grafting	31/80	(38)

Adopted from Bunt (21), a 1983 review of 290 reported patients with AGEF/PPEF.

vascular prosthesis does not appear to result in retroperitoneal sepsis and refistulization in cases of primary fistulas (39). The bacterial invasion in such cases is apparently limited, involving only those tissues immediately adjacent to the tract, and can be easily excised. Infection in patients with secondary fistulas is more extensive, the prosthesis acting as a foreign body facilitating bacterial spread (12).

Graft excision alone may be adequate in certain carefully selected situations. In patients with good collateral vessels in whom the original aortic procedure was for occlusive disease, in patients with thrombosed grafts, or in patients with previous amputations, an extra-anatomic bypass graft may not be needed to maintain adequate circulation (8, 12). Conversely, several authors have argued that the inability to accurately determine the adequacy of distal blood flow dictates that every patient should undergo extra-anatomic revascularization (12, 21). Kleinman et al (12) reported that in two patients who were not revascularized, the appearance of viable extremities in the immediate postoperative period proved to be an unreliable guide to the eventual outcome. Significantly, Bunt (21) found that graft excision without revascularization resulted in a mortality rate of 74%.

Perdue et al (16) summarized in sequential steps their approach to management:

1) axillofemoral bypass grafting, unless laparotomy is required initially to confirm the diagnosis; in such cases, this step is performed last
2) laparotomy and graft excision; suture of the aortic stump incorporating prevertebral fascia for additional strength; oversewing of the distal aorta or iliac arteries
3) suture repair of bowel wall or limited resection and anastomosis if a large defect exists
4) decompression of bowel by tube enterostomy and gastrostomy (nutritional support can be provided through the distal tube enterostomy if required)
5) sump drainage of the retroperitoneal space if severe suppuration exists
6) 3 weeks of antimicrobial therapy based on the sensitivities of the organisms recovered at surgery.

As graft excision with extraanatomic bypass grafting has become the accepted surgical approach to management, operative methods have improved, and survival rates have steadily increased. Recently several authors have reported mortality rates of less than 20% (9, 16).

Summary/Conclusion

AGEF/PPEFs are infrequent, life-threatening complications of aortic reconstructive surgery. Early diagnosis requires a high index of suspicion. Whenever a patient with an aortic prosthesis develops gastrointestinal bleeding or manifestations of sepsis, the presence of a fistulous complex should be assumed until proven otherwise. In the vast majority of cases, adequate surgical management requires graft excision with extraanatomic bypass. Widespread retroperitoneal infection precludes any attempt at local revascularization.

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OLUME 56 NUMBER 3 MAY 1989

Issues in Medical Ethics
1. Justice and Medical Care
2. AIDS: Crisis for Medical Ethics

Daniel A. Moros and Rosamond Rhodes, guest editors

From the Program in Ethics and the Philosophy of Medicine
Department of Medical Education, Mount Sinai School of Medicine
and the
PhD Program in Philosophy, City University of New York

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F MEDICINE

VOLUME 56
NUMBER 3
MAY 1989

CONTENTS

ISSUES IN MEDICAL ETHICS

Introduction *Daniel A. Moros, Rosamond Rhodes, Bernard Baumrin, and James J. Strain* 157

1. JUSTICE AND MEDICAL CARE

THE RIGHT TO HEALTH CARE: LIMITED OR UNLIMITED?

Why Not a General Right to Health Care? *William Ruddick* 161

The Rights Approach and the Intimacy Approach: Family Suffering and Defective Newborns *Jeffrey Blustein* 164

Age-Based Entitlements to Health Care: What Are the Limits? *Harry R. Moody* 168

Unlimited Entitlement to Health Care: The Dilemma of Narcotic Dependency *Barry Stimmel* 176

COST CONTAINMENT AND JUST HEALTH CARE

Cost Containment and Justice *Norman Daniels* 180

Hard Data on Efficacy: The Prerequisite to Hard Choices in Health Care *Arthur L. Caplan* 185

Legislative Issues in Delivering Health Care *James R. Tallon, Jr.* 191

Ethics and Economics: Implications for Primary Care Training *Marianne C. Fahs* 194

ALLOCATION OF ORGANS AND TISSUES

Criteria for Transplantation: A Physician's Perspective *Lewis Burrows* 197

Procurement and Allocation Policies: Should Receiving Depend on Willingness to Give? *James Muyskens* 202

The Report of the U.S. Task Force on Organ Transplantation: Criticisms and Alternatives *F. M. Kamm* 207

continued

VOLUME 56
NUMBER 3
MAY 1989

CONTENTS *continued*

2. AIDS: CRISIS FOR MEDICAL ETHICS

BACKGROUND

The History of Responses to Epidemic Disease in the United States since the 18th Century *Daniel M. Fox* 223

AIDS: The Challenge to the Press *Erik Eckholm* 230

AIDS: Epidemiology and Treatment Issues *James J. Strain, Marianne Fahs, George Fulop, and Henry Sacks* 233

AIDS: CRISIS FOR PUBLIC POLICY

AIDS: The State of the New York State Approach *David Axelrod* 238

The Ethics of Pandemics *Bernard Baumrin* 242

The President's Commission on HIV: A Personal Report on Related Ethical and Moral Issues *Burton J. Lee* 246

THE DUTY TO TREAT AIDS PATIENTS

1988 AMA Position *Russel Patterson* 250

A Patient Advocate's Perspective *Richard D. Dunne* 252

A Philosopher's Perspective *Anthony Preus* 254

A Physician-Lawyer's Perspective *Joel M. Zinberg* 259

Index to Advertisers

U.S. Army Recruiting	**Cover 3**

Introduction

Issues in Medical Ethics

With the stunning success of medicine in the period since the Second World War—when many lethal diseases have been eliminated, when surgical procedures can restore individuals to normal function, when birth can be manufactured and death avoided—the justness of the distribution of health care to the citizens of the modern state becomes an issue of the first order to each member of a civilized society. Who pays what? to whom? and for what? are issues that involve us all through our taxes, insurance premiums, and direct payments. Should those who can afford it get all they want (need)? Should those who cannot, get less than they want (need)? Who should decide who gets what, and why? These are the core issues tackled at the 1987 conference "Justice and Medical Care," the second annual New York Regional Conference in Medical Ethics sponsored by the Program in Ethics and the Philosophy of Medicine of the Mount Sinai School of Medicine. The proceedings of the conference, held March 6, 1987 at Mount Sinai Medical Center in New York City, constitute part 1 of this issue of the *Journal.*

The moral drama of the AIDS epidemic is like a hundred thousand passion plays crossing the stages of every hospital in every urban center. The health care worker, frightened by the patient and the patient's illness, is caught between duty and fear. And those stricken are terrorized by fear of dying, pain, abandonment, and are filled with despair at a life cut too short. The issue of social justice again arises as the care of AIDS patients competes for economic resources at a time of cost containment and as the disease increasingly becomes an epidemic of the socioeconomic underclass. Thus the epidemiology of AIDS forces us to confront inequality within our society. "AIDS: Challenge for Medical Ethics," the 1988 conference in the same series, held on March 4 that year, is presented here as part 2.

What distinguishes this collection of papers is that the questions are addressed from a moral point of view. We have tried to focus the participants' collective attention on what we ought to do instead of just the facts of what is being done and what is likely to happen. Only when we all know clearly what our duties are can we, as part of a larger society, address ourselves to the right solutions, and press others to the same ends. In organizing these conferences we have set questions controversially with the firm belief that out of direct opposition, seriously pursued, the strength of the superior view will be more plausibly displayed. So we have not backed away from the clash of ideas, but embraced it. Thus, the issues discussed—like our program—are not merely questions for philosophers, physicians, or policymakers but a collaboration, jointly addressed and jointly pursued. In the end a social policy so formulated will be better founded, better performed, and better implemented than any pursued in the splendid isolation of any one discipline.

The Program in Ethics and the Philosophy of Medicine of the Mount Sinai School of Medicine is a joint endeavor of Mount Sinai and the PhD Program in Philosophy of the Graduate School of the City University of New York. Initially begun in 1981 with funding by the Mellon Foundation, the program, now part of the Medical School's Department of Medical Education, is designed to provide philosophers with an opportunity to work and train within a medical center, and to enable physicians and other medical personnel to examine issues in ethics and the philosophy of science relevant to clinical practice, biomedical research, and public health policy.

A unique feature of the program—exemplified in this issue—is its emphasis on a collegial interaction between philosophy, which here comes out of the "ivory tower," and medicine, which here leaves "the trenches." At the medical school, all formal instruction involves coteaching by both physician and philosopher. The teachers themselves provide the model for how the medical school (the medical world) and the university proper (the philosophical world) may productively interact. Annual conferences in medical ethics reflect this interaction: physicians, philosophers, and public officials examine and debate timely issues of medical ethics in dialog with each other.

Other educational activities of the program continue the dialog:

- A monthly Faculty Seminar in Philosophy and Medicine for discussion of scholarly papers by faculty of the School of Medicine and the Graduate School
- A course in Bioethics and Philosophy of Medicine cotaught by a philosopher (Bernard Baumrin, Philosophy, the Graduate School) and a physician (Daniel A. Moros, Neurology, Mount Sinai) for PhD students from the Graduate School and medical students at Mount Sinai
- Case conferences and teaching rounds for students, interns, residents, and attendings, led by graduate fellows in philosophy and senior faculty of Mount Sinai, currently including departmental chairmen of pediatrics (Kurt Hirschhorn); medicine (Richard Gorlin); surgery (Arthur H. Aufses, Jr.); and ophthalmology (Steven Podos)
- Minicourses in medical ethics for all first-year and second-year students
- Plans to encourage medical students to pursue a Master of Arts degree at CUNY emphasizing either ethics or the philosophy or history of science.

The program coordinator is Rosamond Rhodes (Hunter College and the Mount Sinai Department of Medical Education).

The program aims to (1) provide a variety of structures for the students, house staff, and attending staff to consider issues related to medicine that intersect with philosophy, ethics, law, history, sociology, and other disciplines; (2) provide an appropriate medical environment for nonphysician scholars concerned with issues related to medicine; and (3) promote research and scholarly work on significant ethical and philosophic issues affecting health care. This issue of the *Journal* reflects these aims and the growing appreciation—in the Mount Sinai community and in the world of medicine—of the importance of examining the social roles of medicine.

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Issues in Medical Ethics

1. Justice and Medical Care

conference held March 6, 1987
at Mount Sinai Medical Center in New York

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Why Not a General Right to Health Care?

WILLIAM RUDDICK, PH.D.

Abstract

Common objections to a right to health care reflect questionable assumptions about the nature of rights, power, illness, inequality, and money. A right to health care can be based on other more general rights to life, liberty, and health, as well as on considerations of equality and the medical profession's professed moral commitments. However based, it need not "enslave" or coerce physicians and nurses, nor force us to sacrifice other social goods. But consensus is unlikely except on specific rights to certain kinds of health care.

Employees of companies that have insurance plans, and members of health maintenance organizations, have specific rights to health care created by contract; veterans, the elderly, and the indigent have somewhat differing specific rights created by legislation. But is there—for everyone—a general right to health care, prior to contract or legislation? a right which derives from other rights or duties or general features of humanity and society? I wish to survey very briefly some political, economic, and moral objections to such a general right, as well as various grounds on which this right might be based.

Political Objections

Rights Justify Demands But Not Force. Some opponents claim that a right to health care would justify coercion and theft, hence violate other rights to liberty and property. By analogy, a right to eat would allegedly enable people to take from a baker whatever bread they wanted, thus "enslaving" bakers. Just so, a right to health care would, it is said, enslave doctors and nurses (1).

This objection involves, I think, a confused caricature of rights. Rights may justify demands, but do not necessarily justify force. In general, a right does not entitle the right-holder to use force. In exercising rights of free speech, I cannot, for example, drag people off the street or lock the doors against their leaving. Even if I have a right to your help, I may not force you to provide it, especially when my right is against some third party, but not against you.

Think of our right to an education, a right not against teachers, but against a government. We cannot force people to teach us, but we can demand that the government provide teachers who will do so. The government might honor our right to an education by conscripting teachers, but except in dire conditions coercive recruitment is unnecessary. Economic inducements are normally sufficient to secure teachers. If a general right to health care required a large staff of doctors and nurses, they could presumably be recruited in similar ways.

Some kind of taxation would be needed, and taxation is often thought of as coercive. But it is the taxpayer, not the doctors and nurses paid from taxes, who would be coerced. Physicians currently employed by the Veterans Administration may be overworked, but they are in no sense enslaved.

Rights Always Limit Powers. Admittedly, a right to health care would in certain ways limit the current power of the medical establishment. That is the nature of all rights, legal and moral. Political rights protect individuals against the power of the state. Likewise, moral rights protect minorities, or the relatively helpless against the cultural majority. Thus there is agitation for black rights, women's rights, gay rights. But—as

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opponents appreciate—the appropriate counter-slogans are not "White Rights," but "White Power"; not "Men's Rights," or "Heterosexual Rights," but "Preserve the (Traditional) Family."

How might limiting the power of the medical establishment be justified?

Justifying Limits: The Profession's Social Contract. One appeal might be to a duty which doctors, as members of the medical profession, collectively incur. Public funds support the institutions in which the medical profession conducts training, practice, and research. In public oaths, the profession commits its members to serve humanity. In these and other ways, the profession may seem to undertake a "social contract" which generates a general right to health care. Accordingly, the profession would be expected to discourage maldistribution of specialists, fee scales which exclude the poor, racial and sex discrimination in training and treatment, and so on. Such limitations, if so founded, would not be coercive or invasions of liberty.

Justifying Limits: Rights to Life and Liberty. There would be other ways to justify a right to health care and resulting limits on medical power. Appeal could be made to more general rights we already accept in our society. Without at least a certain level of health, one's life is in danger and one's liberty of action is restricted or useless. Hence, health is a prerequisite for life and liberty. Hence, we might try to ground the right to health care on more general rights to life and liberty, or, derivatively, on a right to health.

Clearly, such grounding would not generate rights to all available medical services, as critics fear. Much health care does not preserve life or liberty. Indeed, for that matter, much health care does not preserve or restore health. Some critics take this failure as disqualifying the very notion of a right to health. They argue that we may have rights only to what is available or providable; since health often cannot be maintained or restored by even the best health care, there can be no right to health.

This objection, however, is doubly dubious. Rights do not require success, but only reasonable effort. We have a right to bodily security and to liberty, even though the police can often guarantee neither. Moreover, health care does in some matters virtually guarantee health. For example, perinatal and pediatric care have high rates of success in saving lives, vision, hearing, and other bodily functions necessary for full adult autonomy. Likewise, for a range of life-limiting or life-threatening adult ailments (diabetes, malaria).

Justifying Limits: Appeals to Equality and Fairness. A related basis for a general right to health care is provided by our shared political notions of equality and fairness. Equality of opportunity would require health care to prevent or compensate for those illnesses and defects which constitute handicaps in the (race)course of life. Competition aside, we often think of illness and injury as forms of victimization. (Why should this happen to *me?* What did she do to deserve this?) And this sense of injustice is compounded when the ill are denied readily available health care for want of money.

In our society, much wealth seems merely a matter of good fortune—a product of inherited money and class advantages, lucky investments, or chance shifts in consumer tastes. (There is arresting irony in Wall Street gamblers claiming, "We make money the old-fashioned way—we earn it!") Conversely, many illnesses are a matter of bad fortune—the product of poor genes and class disadvantages, of working conditions, diets, habits, or treatments with hidden, long-term pathologies. The issue is whether the felt injustice of illness and the inequalities which illness produces should be compounded by the inequalities which good fortune bestows. A right to health care would reduce the disparities in health between the fortunate and the unfortunate.

Economic Objections

Some people might be inclined by such political reflections on rights, power, inequalities, and unfairness to support a general right to health care, but hesitate for fear of economic consequences. "We cannot afford to recognize such a right," it is often said. "Health care is already 12% of the GNP and rising. Any more additions to existing specific health care rights would require us to sacrifice other social goods (education, support for the arts)."

Health Care Benefits Nonpatients Too. First, we should remind ourselves that health care expenditures benefit more than patients. Health care is very rewarding work, or at least better work than many health workers would find elsewhere. The intrinsic rewards often surpass those in many other tax-supported jobs.

For Whom Is 12% of GNP Too High? Then, before joining this rising economic lament, we should press for answers to several questions. What part of the current 12% represents effective health care, rather than administrative inefficiencies or unjustifiable profits? And why is 12%

too high? Who precisely cannot afford more? And why are the alleged "hard choices" always posed between health care and other social goods, like education and environmental protection? Why not between health care and tobacco subsidies, or aircraft carriers?

A General Right to Health Care Does Not Entail Unlimited Access. Economic opponents may allow that "we" could afford more health care without sacrifice of social goods, but still object. A general right, they might say, would multiply wasteful and inefficient use of resources. Seriously defective newborns, irreversible comatose elders, people who overeat, overdrink, and overdrug themselves—all would have claim to services, were there a general right.

Such unlimited access does not, however, follow from a general right. Rights whose exercise clearly confer no benefit do not demand unlimited implementation. Moreover, any right—including those to life and liberty, hence to health—can be forfeited. Economic critics may wish to avoid such moral issues. On the other hand, their "economic" objections may be implicitly moral. The services judged most wasteful and inefficient are likely to be services expended on patients thought to be *undeserving*. Let us turn then to such explicit moral objections.

Moral Objections

A right to health care would, it is said, relieve people of responsibility for their own health. It would reward those who knowingly lived in ways which contributed to their illness. Let us call such people "autopaths." These "autopaths" are said to have little claim on us or our institutions for health care. A child with a liver defect may be viewed as a victim of injustice, handicapped in ways we should try to correct. But not so, an adult alcoholic. A right to health care, it is said, would seem to entitle them equally to liver transplants—a morally obtuse consequence, it might seem.

Can We Distinguish between the Deserving and the Undeserving Ill? We should, however, remind ourselves how little we know about the etiology of drug addictions and other alleged "autopathies." Causal judgments are complex; even more so are moral judgments that depend on causal judgments. Before refusing the alcoholic, we might want to know how much he or she knew about the effects of drinking, or how great the pressures on him or her to drink. Have alcoholics freely chosen to risk their livers? Have they freely chosen to drink in a society in which social drinking is often mandatory? Are people to be denied livers for failing to defy social mores? Do we make exceptions for laundry workers who drank after working with carbon tetrachloride?

And are these judgments and discriminations we, or physicians, should be making? In traditional and current codes of medical ethics, physicians are committed to address medical need, without moral judgment about etiology. The ill are to be regarded primarily as, in Maimonides' words, "vessels of pain" ("The Physician's Prayer.") A patient's habits or actions are relevant only to the extent that they bear on diagnosis and prognosis.

Even if we cling to the medieval view that illness is God's punishment, it would seem morally presumptuous and excessive to withhold treatment as further punishment. However disapproving of homosexuality or heroin use, could a physician—or anyone else—justify withholding treatment from someone with AIDS as morally fitting in any respect?

In short, the distinction between the deserving and the undeserving ill seems morally dubious and at odds with medical tradition. If so, it should not be used to oppose recognition of a general right to health care.

Settling for Occasional Agreement on Limited Rights. In summary, I find these common objections to a general right to health care highly questionable, or worse, and I have suggested ways in which that right might be grounded. But I do not expect much agreement. If a general right to health care turns, as it seems, on our conceptions of money, power, illness, chance, and inequality, then consensus is unlikely. We may have to settle for occasional agreement on the rights of certain groups of people to certain kinds of care for certain kinds of ailments, limited as now by various kinds of power often masquerading as economic necessity or liberty.

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The Rights Approach and the Intimacy Approach:

Family Suffering and Care of Defective Newborns

JEFFREY BLUSTEIN, PH.D.

I want to distinguish between two moral conceptions of parent-child relations and then explore some of their implications for the treatment of impaired and imperiled newborns. The first I call the "rights approach," the second the "intimacy approach." My aim here is to give a fuller account of the normative context of family relations than is usually found in discussions of the treatment of these newborns, as well as of other issues relating to family caregiving (1). While I shall make no attempt to provide a theoretical justification of these different approaches, I believe that family members typically conceive of their ties to one another in both of these ways.

The Rights Approach. Theories of parent-child relations that emphasize rights can be classified roughly into three types: parents' rights, children's rights, and family rights.

Parents' rights theories regard the interests of parents as fundamental. The child is a part of the life of the parents, and parents have the right to arrange their lives to please themselves.

Children's rights theories regard the liberty or basic needs of children as fundamental. Parents are expected to provide for their children's basic needs and may not take their own interests into account in doing so; or alternatively, parents are expected to refrain from using any form of coercive control over their children.

Family rights theories accord fundamental rights and liberties to parents and children alike, permitting parents to raise their children as they see fit within specified limits that acknowledge the rights and liberties of the children. Parents' rights theories are only held by advocates of the most extreme parental prerogative, and I know of no one (with the possible exception of Hobbes) who consistently espouses such a view in its pure form. Child liberationists, and perhaps some child protectionists, belong in the second camp. Most liberals hold a family rights type of theory, according parents substantial authority to control the lives of their children, but also recognizing that children have distinguishable interests and liberties in need of protection.

The Intimacy Approach. A number of philosophers have challenged the wisdom of thinking about intimate and personal relationships (of which the family is a prime example) in terms of rights. I can only give here a quick summary sketch of some of the lines of criticism (2–5). The main thrust of the criticisms is that the traditional categories of rights and their correlatives, duties, employed by moral philosophers misrepresent important moral features of intimate relationships.

The language of rights, it is argued, rests on a picture of the person as an atomistic, primarily egoistic, and asocial creature, related to others only in an accidental and external way. Rights-bearers may cooperate with each other in the pursuit of common goals so as to maximize their own self-interest, but the cooperation itself is of no intrinsic value to them. Rights are needed to protect persons from one another, to define obligations that set limits to the pursuit of independent self-interest. The language of rights helps us to sharpen our understanding of the moral boundaries that separate people and expresses the conviction that persons are independent and autonomous agents. Persons concerned primarily with their rights and duties are focused primarily on what is due them and on what is due others from them. Finally, rights are impersonal moral

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categories, appropriate for highly structured, legalistic, or institutionalized contexts.

This picture of the person evoked by the language of rights is not, critics contend, the model we should use for understanding personal and intimate relationships. In such relationships, we do not need to be protected from those who love and care about us, nor can we claim that the other's love and affection is something we have a right to. The relationship is not instrumentally valued as a means to the promotion of the independent ends of the participants, but is something they cherish and care about for its own sake. Here interests are not independent of each other, or merely congruent or convergent, for it is in the interest of one participant that the interests of the others be satisfied. Of course, even in intimate relationships there are conflicts of interest, but these conflicts take place within the framework of closeness and caring that each person has for the other, and they are typically not settled by the participants invoking and standing upon their rights.

This contrast between the language of rights and the language of intimacy is suggestive, but the two perspectives are not necessarily exclusive. When I speak about two moral conceptions of parent-child relations, I do not mean to set up an opposition between them. On the one hand, a morality that is sensitive to special relations and personal commitments need not and should not abandon the categories of rights and duties, if only because sentiment may motivate us to do what is morally unfitting and improper. Rights and correlative duties are a general normative backdrop for most human interaction, interaction among family members included. On the other, a morality that employs only categories of rights and duties to understand human interaction is implausibly abstract and inattentive to the significance of intimate relationships. We could view family intimacy as establishing another kind of right, a right belonging to the family as a unit, but in so doing we would be taking up an external and impersonal point of view that does not reflect the importance of commitment and solidarity to the particular individuals *within* the relationship.

Viewed as an intimate relationship, and giving intimacy moral and not just practical or sentimental significance, we have a moral conception of the family that is not captured in terms of the language of rights, whether these be the rights of the parents alone, of the children alone, or some balance of parental and children's rights. Rather, the family is seen as a mini-community characterized by close interactions and relations among its members on a variety of levels. These members include mother or father, or both, child or children, and possibly grandparents as well. In our society, the destiny of this unit, its shaping, direction, redefining, and restructuring, is charted by the parent or parents, at least until the child or children reach adolescence.

Implications for Treatment

What I now want to consider is whether the two moral conceptions of parent-child relations have, or may have, different implications for treatment decisions affecting imperiled and severely defective newborns. Will one conception legitimize certain decisions the other would not, or at least not as easily?

The Intimacy Approach and Family Suffering. One difference seems to be that the intimacy approach gives greater weight than the rights approach to the suffering of the family in decisions about the treatment of severely defective newborns. The assumption here is that treatment of the newborn, considering the infant in isolation, may be responsive to a right of the infant but destructive of the family as a unit. How a particular family adjusts to a defective child is of course related to the customary ways in which it deals with stress, and we should be careful not to overgeneralize. But the psychological impact of the birth and nurturing of a malformed or defective infant on family members may be devastating. Parents may find (and have good reason to believe that they will find) their capacities to care taxed to the limit, and siblings may react with hostility and resentment.

It is not that the burdens and frustrations of raising a defective infant necessarily violate anyone's rights, but rather that they may (note: may, not must) create divisions and antagonisms within the family that undo the unity, the togetherness, the "we" that its members have created. On the other hand, the infant's condition, though severe, may be such that he or she satisfies certain criteria of moral personhood. The infant may then be judged to have a right to life, in which case withholding treatment for a life-threatening condition will be seen as seriously wrong. From the perspective of rights, it seems wrong to do what, from the perspective of intimacy, it seems right—or at least not as wrong—to do.

If we distinguish between different moral conceptions of the family, we must be prepared for conflicts generated by the adoption of these conceptions. Even if intimacy has some moral weight in treatment decisions, it is unclear just how much and just how far those who adhere to the norm of intimacy should be willing to go to insure continuance of family integrity. Adoption may provide protection for an infant's right to life *and* family integrity, but in hard cases parents will be faced with the hard choice: do not authorize treatment or bring up the child. In these cases, when does intimacy legitimize the decision not to authorize treatment for an infant with a right to life?

Intimacy and a Marginal (Not a Disputed) Right to Life. One suggestion that I believe has at least initial plausibility is that intimacy has its greatest moral weight where this right is *marginal*. As long as a newborn has the capacity for at least minimal autonomous existence (I assume here that the value of rights lies in their providing protection for and nurturance of this capacity), even if the realization of this capacity requires technological assistance, the infant has a right to care; but the right is marginal if the infant has the capacity for only minimal independence. I assume here that there is no reasonable question about whether the infant's condition falls at or above the margin. A marginal right is not a disputed right. Also, I assume that these newborns are not, like fetuses, in a penumbra region where the issue of personhood cannot be decisively resolved.

On this view, concerns of intimacy can override rights in certain circumstances. The neonate is not born into the family circle so much as outside it, awaiting inclusion or exclusion. The moral problem that parents must confront is whether the child should become part of the family unit.

On a different interpretation of how intimacy functions, the newborn is already a member of the family by virtue of the identity of interests that exists between the infant and the parents (6). I cannot explore this view and its implications here. Suffice it to say that if intimacy works in this way, then the moral problem is not whether and when intimacy can override rights, but whether intimacy leaves enough room for newborns to have rights at all.

Often the dilemmas that parents face upon the birth of a severely defective child are posed in terms of conflicts between the rights of the newborn and the rights of other family members. Earl Shelp, in his recent book, *Born to Die? Deciding the Fate of Critically Ill Newborns* (7) conceptualizes the dilemmas this way:

> Parents of severely diseased or defective newborns may reasonably choose not to authorize life-prolonging interventions when one of several conditions obtain: (1) extended life is reasonably judged not to constitute a net benefit to the infant; (2) it is reasonably believed that the infant's condition is such that the capacities sufficient for a minimal independent existence or personhood in a strict sense cannot be attained; or (3) the costs to other persons, especially parents and family, are sufficient to defeat customary duties of beneficence toward a particular human infant.

Only one of these conditions has to obtain to justify withholding consent to treatment. Thus, even if the diseased or defective infants are persons in a moral sense, and are bearers of rights, including a right to life, the costs to the family may be such as to justify not authorizing treatment. Condition three might seem to be an admission of the relevance of an intimacy approach to decisions about the treatment of defective newborns, but on closer inspection it is not. Shelp maintains that resolving conflicts between neonatal rights and family costs is a problem of *justice,* hence a problem of adjudicating competing *claims* to certain resources.

Under certain circumstances, this may be an accurate description of the dilemmas parents face: for example, when raising a defective infant prevents parents from fulfilling their obligations to their other children. But often it is a truer description of these dilemmas to say that they involve conflicts between doing the right thing by the newborn and maintaining the intimacy, the unity, of their family life. When we grasp the personal and moral significance of intimacy in family life, we can understand how concern for intimacy may legitimately override the newborn's (marginal) right to life.

Political Implications. The normative account of family relations presented in this paper could and should be developed at greater length than I have been able to do here.

For one thing, it should be shown why intimacy has to be reckoned with ethically, and not just accounted for psychologically, and this should be shown without begging the question about the nature and reach of "the moral."

Second, the political implications of the intimacy approach should be explored. Specifically, privacy seems crucial for the maintenance and flourishing of intimacy, and this should be explained. Specific kinds of state intrusion into family relationships which depress the sense of intimacy in them should also be investigated and distinguished from those which may actually help families.

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1. Another area where the distinction between these two approaches could prove enlightening is care of the elderly by family members. Linda K. George distinguishes between two norms which she believes are

characteristic of interpersonal relationships in our society: the norm of reciprocity (which falls under but is not exhaustive of what I call the rights approach) and the norm of solidarity (similar to my intimacy approach). She claims that much of the stress caregivers experience can be traced to conflicts between these norms, both of which have been internalized. See her Caregiver burden: conflict between norms of reciprocity and solidarity. In: Pillemer K, Wolf R, eds. Elder abuse: conflict in the family. Dover, Mass.: Auburn House, 1986:67–92.

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Age-Based Entitlements to Health Care:

What Are the Limits?

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Three questions arise in asking whether an entitlement to health care based on age ought to be seen as limited or unlimited:

First, how do we define the boundaries of, and distinguish health care from, other services, such as housing or social supports, with which it is intertwined? This is not a hypothetical question, but a very practical one, because geriatric health care typically involves nonmedical services to a greater degree than do services for other age groups.

Second, what is the normative basis for policies of preference of the elderly—in short, for age-based entitlements such as Medicare? Why should some citizens have a special claim to health care on grounds of chronological age alone?

Third, what principles of distributive justice could serve to limit claims on health care resources? This question becomes urgent when medical technology can provide marginal gains in prolonging life at great cost and with doubtful benefits.

Unless we can answer these three questions, it will be difficult to frame policies that provide equitable access to health care for an aging population in the future.

I look briefly here at the ethical basis for a presumed right to health care, and then consider some reasons for setting limits to claims advanced under such a right. Second, I highlight some equity problems in the current American "nonsystem" for delivering geriatric health care, chiefly public policies for Medicare and Medicaid. Finally, I examine some specific issues of access and limits posed by acute care, long-term care, and mental health services for the aged.

The Right to Health Care

The notion of a right to health care seems to mean that health care services ought to be available to anyone who wants them on demand, that is, without limitations. (I ignore the paternalistic problem of what to do when people need services but do not ask for them, or even refuse them.) In a world of finite resources, does the notion of unlimited entitlement make sense? If health care services could be produced at no cost, or were otherwise not limited by scarcity, it might; but this is not the world in which we live. Scarcity, or at least opportunity cost, must always be considered.

Kinds of Demands for Health Care. There is an ambiguity about the objects intended in discussions of "demands" for health care. A demand is a claim to a service that (a) is relatively abundant under current entitlement policies (kidney dialysis under Medicare) (b) might exist if the supply could be increased (heart transplants) or (c) cannot now be produced at all but might be created with future effort (a cure for Alzheimer's disease). (I ignore services that seem unlikely ever to exist at all, such as an anti-aging intervention to make possible biological immortality.) In short, the notion of services available on demand is an equivocal one that cannot be accepted uncritically.

How are health care resources limited? Some limits arise from human decisions: we choose limits on access to services (for example, to refuse coverage for dental care under Medicare). Other limits arise from constraints in the nature of things: no matter what we want, access is limited by the nonexistence of what is desired (a cure for

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Alzheimer's disease). This distinction is fundamental to questions about potential demands for services.

These distinctions about what it means to "demand" a service can be directly applied to our actual, nonutopian world of scarcity, in which we have to make various kinds of allocation decisions: decisions about distributing existing resources; decisions to produce alternative resources; and decisions about devoting efforts to creating new, unavailable resources. These distinctions are crucial to the question of whether age can properly be used as a standard for "rationing" health care resources.

The point of stressing these distinctions is that there will always be a question of what services *ought* to be created so that people could make demands, even if they do not press their claims today. But most discussions of distributive justice and health care tend narrowly to focus on decisions within the status quo. That is, the discussion takes for granted a fixed set of existing services and resources on which competing distributive claims are to be made (should Medicare pay for bypass surgery on the terminally ill?). Such ethical debates "at the margin" leave more fundamental questions unexamined. Neither supply nor demand should be taken as fixed by the contingent configuration of services that now exists. Far more important, but often unasked, is the question of what services ought to be demanded.

Discussions of health care for the elderly today are preoccupied with stereotyped alternatives—for example, bureaucratic criteria (eligibility standards, means-testing) in contrast to free-market mechanisms (private long-term care insurance). But both approaches to the allocation problem fail to distinguish between the kinds of services being demanded: namely, are they demands for hypothetical services or would they be demands if the agents were not acting under the constraints of the status quo.

The Conservative "Free Market" vs The Liberal "Need" Position. In conventional debates about health policy, two opposing positions are familiar: a conservative view (that services should be distributed by a free market) and a liberal view (that services should be distributed on the basis of need).

The first thing to be said about the liberal view is that it accepts the principle that access to health care must be limited. The concept of need is precisely the criterion for a legitimate limiting principle. The most liberal view of access to health care would not allow hypochondriacs to demand unlimited treatment for imaginary ailments, nor allow quack remedies to be distributed on request. Under the liberal view, access would be limited to all, and only, those to whom the service offers some benefit, those who need the service.

The notion of access based on need, rather than demand, is not itself a basis for unlimited claims, by the aged, or anyone else. Quite the contrary. It follows, for example, that the amount of health care provided to the terminally ill should have severe limits by medical criteria, regardless of their demands (1).

Priority to the Least Advantaged. Here a skeptic might reasonably ask, Why should we grant that people have any right to health care, since "need," along with "demand," turns out to be an ambiguous concept? One persuasive answer is given by John Rawls, who argues for rights to what he calls "primary goods," those things that are indispensable for achieving other goals in life, whatever our individual life plans happen to be (2, 3). If we grant some general right to a "decent minimum" of such primary goods, it makes sense to think of health itself as such a primary good, because good health is indispensable to exercising any other rights that we might recognize (4).

Guaranteeing everyone such an equal opportunity for health seems necessary if we want everyone to enjoy equality in exercising other rights and liberties (the rights of citizenship, the right to earn a living). In other words, the right to health care, at some decent minimum, follows from the commitment to provide citizens with equal opportunities in life. Some argument along these lines seems to be widely accepted in our society (5).

Once we descend from this lofty realm of argument, serious problems arise out of scarcity. We lack the resources to satisfy all possible claims on health care resources. How are we to allocate limited benefits or services when the demands or needs outpace what is available? Which people, or what needs, shall have priority in distribution decisions (6)? If we collectively had the money to insure universal access to all existing services, we would still face the question of what potential services we should try to produce in the future. There is no way to avoid the priority problem.

Rawls himself argues that any distribution of goods should be such as to improve the condition of the "least advantaged" members of society. But with respect to health care, how are we to identify the "least advantaged?" Those who are sickest? poorest? have the worst life chances? What if the "least advantaged" rule requires us to allocate health care to those for whom health care services will do the least practical good (an end-stage Alzheimer's patient who also hapens to need a liver transplant)? Does the "least advantaged" principle support a positive age-based preference or entitlement? Should the elderly be singled out as a group legally entitled to minimum health care services, especially if, as a group, they turn out not to be least advantaged?

Priority by Cost-Benefit. Problems with health care rights and age-based entitlements will prompt some to reject this framework altogether and instead opt to distribute health care through some version of a cost-benefit or utilitarian standard. On this view, we would try to maximize the benefits produced by a finite set of resources. Some clear consequences flow from this position. For example, we would permit neither liberal health care rights nor a free market to allow scarce resources to be wasted on people who cannot benefit from them (people who demand them but don't "need" them as much as others do).

The cost-benefit standard, obviously, could have dismal implications for the elderly. If objective need is redefined in terms of relative benefit, the old are apt to lose out in the competition for scarce resources. For any given intervention (an expensive surgical procedure, say), the number of life-years produced by a success will, on average, diminish with increasing age. Since actuarial life expectancy is lower, the elderly will end up last in line for health care, even if their immediate need seems greater. Cost-benefit analysis, then, is implicitly "ageist" in its implications (7). Ironically, the age group most vulnerable to illness ends up with the least claim on health care resources.

There may be some ways around this uncomfortable conclusion. A strict cost-benefit calculus could be softened to take account, say, of "quality-adjusted life years." In that case we would withhold health care resources from people not on grounds of chronological age, but on some formula combining quantity and quality of life gained. But again, whenever age is taken into account in cost-benefit terms, dismal implications soon become apparent. If a utilitarian standard were publicly acknowledged, that standard would seriously diminish the respect for and the dignity of the elderly.

Priority by Cost Effectiveness. Thus far we have looked at two polarized views on what the right to health care might imply: priority to the least advantaged (as long as there is some incremental benefit), vs. priority to those for whom health care services produce the greatest net benefits. The first approach is tied to a concept of individual rights, the second to a concept of maximizing welfare. Between these two extremes are those who recognize some role for considering both rights and utility in allocation decisions. This approach need not involve cost-benefit assessment, but rather some cost-effectiveness assessment. No assumptions need be made about measuring net benefits or welfare. Instead, we simply adopt a particular outcome as an end and compare alternative means to that end. For the chronically ill elderly, the goal might be living independently in one's own home. Any particularly configuration of health care services can be judged according to how efficiently it reaches that goal.

Here both rights and consequences are taken into account. The goal may be established as a right, an end in itself, and the means to this end can be judged by standards of efficiency. In other words, we explicitly avoid trying to compare the goal, or benefit, with alternative benefits that might be produced under every alternative distributive pattern. But we retain some standard for comparing alternative uses of health care resources, and, perhaps, a principle that could limit claims on those resources under some circumstances.

Choosing Goals. Stated this way, a standard of cost-effectiveness seems perfectly reasonable. But it begs an important question: what sort of goals are reasonably worth trying to achieve? Why should we adopt a goal (living at home) in the first place? How does this become a right at all?

Remaining in one's own home is certainly a goal cherished by most elderly people. But ought the elderly to have an entitlement to unlimited efficiently deployed services which would be required to achieve that goal? Round-the-clock, 24-hour home care, for example, is expensive; why should some people have such a right, while others (younger disabled people, or other old people who could live at home) lack access to the home care they need?

Evidently we need some criteria for setting priorities on access to home care. Lacking such criteria, decisions will be made anyway. In the last five years Medicare has sharply curtailed access to home care. But these allocation decisions were made in accordance with behind-the-scenes administrative rules, without public discussion. No one doubts the need for home care. But attempts to set limits to it are difficult to justify as long as individual "need" remains the exclusive standard.

Perhaps the problem is stated wrongly. What if "the goal" is conceptualized differently, as the efficient and cost-effective management of the debilitating consequences of stroke? Further, what if we can achieve the same result, at lower cost, by putting the patient into a nursing home, instead of providing round-the-clock home care? Wouldn't it then follow, on the cost-effectiveness standard, that old people have no entitlement at all to home health care, at least in those cases in which a comparable improvement could be provided more cheaply in an institution?

A problem arises about what constitutes "the same result." Those who favor a quality-of-life standard might plausibly argue that the quality of life in a nursing home is far worse than at home. But that response takes us no further in deciding just how we are to set limits or appraise the strength of various kinds of quality-of-life demands. The quality-of-life principle introduces an element notoriously difficult to include in quantitatively based measures of cost-effectiveness. How much home health care, for example, ought we to provide for very sick patients who would (objectively) have better chances of recovery, and perhaps ultimately a better quality of life, in a hospital? Is "quality of life" a standard established by objective or subjective criteria (8)? The "health care on demand" principle proves unworkable because it is entirely subjective and open-ended. But other principles—need, access for the least advantaged, cost-effectiveness, and quality-of-life—each pose their own difficulties in setting limits on claims to finite resources.

Some Equity Issues in Health Care for the Elderly

The American Nonsystem. A peculiarity of American health care policy is age-based entitlements. Access to some decent minimum of health care may well be a universal right. But the only group for which this right has successfully achieved the force of law is the elderly under the Medicare system. Eligibility for Medicare is based solely on chronological age, not income or health status. Access to specific medical services under Medicare, of course, is limited to those in need. When Medicare was instituted, the elderly, in the aggregate poverty rate, constituted some significant part of the "least advantaged" (9). But by the 1980s, the poverty rate of the aged, as a group, has declined dramatically. The presumption that old people, as a group, are "the deserving poor" is no longer so plausible (10).

However, other rationales for age-based entitlements have been put forward. One of the most persuasive is Norman Daniels' view (11) that age-based entitlements, such as Social Security and Medicare, are intergenerational transfer programs, a form of prudent "savings" by younger age groups who transfer resources to older age groups. The young thereby establish a claim to support when they are old, so that age-based entitlements can be justified by what Daniels calls the "lifespan prudential framework." Essentially, Daniels' argument involves an extension of Rawls' Original Position model for policy making. It amounts to asking how prudent deliberators, acting "behind a veil of ignorance" (without knowldge of their own health, age, sex, or economic, or social positions) would distribute health care resources over the lifespan. On this view, the conclusions of such hypothetical ignorant deliberators would represent the morally just and impartial policies which should then be adopted.

An important result of this Daniels-Rawlsian exercise is that the elderly turn out to be entitled to health care because they are simply our future selves. The merit of this argument is that it allows the justification of age-based entitlements as a universal legal right. But the right to health care on the basis of age is not unlimited. A "decent minimum," or even an adequate amount of care in old age, is what deliberators behind the veil of ignorance would have chosen in accordance with some view of a "natural" or "normal" life course (a "normalized opportunity range"). The same notion of a "normal" life course is shared by Daniel Callahan in *Setting Limits* (12), a book that explicitly calls for rationing certain forms of health care on grounds of advanced age (13).

U.S. Health Care System for the Aged. The current configuration of geriatric health services in the U.S. (14) is not the result of any clearly conceived policy, but arose as a consequence of incremental policy decision since the 1950s and reflects contradictory values of equity, equality, and efficiency, values which coexist in uneasy tension (15).

The basic configuration of the geriatric health care system includes three major sectors: a universal, age-based public system, Medicare, based on the acute-care model; a means-tested public system, Medicaid, originally designed for the poor but now providing the bulk of public funding for long-term care for the elderly; and private health insurance (e.g., Medigap) together with private fee-for-service care (physician services, nursing homes) for those who can afford to pay. Each of the three sectors reflects divergent ethical principles: equality and universality (Medicare), access for the least advantaged (Medicaid), and individual freedom of choice (the private market).

Apart from the fragmentation and incoherence of this "nonsystem," critics have pointed to other serious deficiencies in this provision of health care for the aged. In Medicare, there is a bias toward acute-care coverage and inadequate attention to chronic diseases—exactly the opposite of what almost every informed analyst believes to be appropriate. In Medicaid, access to service depends on a means test; it is for the poor alone. In effect, older people in America can currently gain access to long-term care only by either paying themselves or "spending down" their assets to reach Medicaid eligibility levels of poverty. This combination of policy criteria creates serious equity dilemmas in the administration of the Medicaid program: for example, in deciding how to count specific assets, who is genuinely poor or least advantaged, or how to treat community property of spouses for determining eligibility.

Financing the Nonsystem. The current nonsystem also suffers from serious failures of efficiency, revealed by the exploding cost of public health care for the aged (16). This cost explosion has tended to overshadow other policy concerns about geriatric health services. Nationally, over 40% of Medicaid expenditures now go for nursing homes. In Medicare, there has been an unforeseen cost explosion: the program now costs over $75 billion. Despite cost-containment measures introduced in 1983, inflation in the health care sector continues at rates far higher than for other consumer items. This spending spiral casts a shadow over the future of the program as a whole and has a chilling effect on any attempts to introduce measures that might reduce inequities in the present system.

One of the nagging equity problems is suggested by the fact that the elderly today spend as high a proportion of their income on health care as they did in 1965, when Medicare was first introduced. Another set of equity problems is created by the way Medicare is financed—a combination of payroll taxes, premiums from beneficiaries, and general revenues. Each of these mechanisms has problems of its own. The payroll tax is a flat percentage of earnings and is therefore highly regressive. Along with the FICA Social Security tax, it now constitutes a serious burden for the working poor. Recently, more than half the taxpayers in America were paying more in Social Security and Medicare taxes than in federal income taxes (17).

Generational Equity. In recent years there has been vocal public debate over the issue of "generational equity" created by taxing one generation to pay for the health care of another. The problem is not entirely resolved by Daniels' lifespan account (18). His perspective (the aged as "our future selves") concentrates on age groups but ignores historical birth cohorts.

Different historical cohorts enjoy very different rates of return under social insurance programs. The equity problem here would be less serious if the future were secure, that is, if current workers had full confidence in the integrity of these programs. But, given recent rates of expenditures growth in health care, current workers can hardly be blamed for having little confidence in the future of social insurance programs. If benefit programs, like Medicare, are cut in the future, there is a risk that later historical cohorts will be treated unfairly. It would seem that an indispensable requirement of intergenerational justice is to design social insurance programs, including Medicare, that are stable over many generations and thus treat fairly the different historical cohorts who participate in the program.

Flat-Fee Premiums. There are other equity problems on the beneficiary side. Flat-fee Medicare premiums, along with fixed deductibles and co-payments, are a regressive burden on the elderly poor. In effect, Medicare provides a disproportionate subsidy to the middle-class elderly. The poor elderly, even when enrolled, do not participate or draw benefits at the same levels as the more well-to-do. Proposals for increased flat-rate premiums do nothing to alleviate these equity problems but may even exacerbate them. By contrast, income-related premiums under the recent catastrophic health insurance act, like similar proposals to expand Medicare for long-term care coverage by income, respond to the equity issue directly without the stigma of a means test (19).

There are those, especially advocates for the aged, who would respond to all these equity problems simply by putting more money into the present system, not from payroll taxes or flat-rate premiums but from general revenues. Since general revenues are financed by a (relatively) more progressive system of general taxation, this approach is an attractive one. But pouring more money into the system in itself does nothing to address efficiency problems or the issues of generational equity raised by critics.

Roads to Systemic Reform

There are increasingly influential voices who see our current profligate health care system, along with environmental depletion and deficit spending, as another instance of stealing from the future and misallocating our public resources. According to these critics of the current system, providing more general revenues pushes up the federal debt, leaving future generations to pay the bill, and gives no incentives for reforming or reconfiguring the health care system for an aging population.

The entire structure of the current system invites serious criticism from the standpoint of justice or equity. The current system grew up in incremental fashion, without explicit trade-offs or choices among competing patterns of services in geriatic health care. It is this fact that makes reform of the total system so difficult to carry out (20). Those countries that have made more explicit choices seem to opt for a very different pattern (21). Specifically, in geriatric health care, countries like Britain and Canada opt for a different ratio of "soft" services, such as social supports or home health care, to "hard" services, such as high technology medicine (22).

Of course, those countries do not produce every service that could conceivably be demanded. Scarcity is a fact of life, and those societies make choices and confront limits. In some cases, such as kidney dialysis in Britain, these choices are sometimes described as "rationing" and therefore seem to invite criticism, particularly where they end up denying scarce resources to people on grounds of age alone. But Daniels, among others, has argued that, even when such countries ration high-technology services, as in dialysis, the resulting pattern of distribution may well be judged fair. Indeed, it may be fairer than our own nonsystem, which involves a bewildering maze of eligibility requirements, matched by extravagence in some services and stinginess in others.

If we are to provide health care services attuned to an aging population, it will be necessary to both expand access to some services and limit access to others. The resulting configuration would probably be quite different from our chaotic "nonsystem." How can we accomplish that transition?

Accepting Limits. One useful step might be a more explicit and public discussion of mechanisms for limiting access to health care services. It appears that such a dialogue has been avoided because overt political discussion of health care in America, whether on the liberal or the conservative side, cannot tolerate the idea of setting limits through collective choice (23). The usual public debates about allocation focus heavily on overt mechanisms for limiting demand: for example, the marketplace, or the bureaucratic reimbursement system. Policymakers find it easier to tinker at the margin with approved professional fees or reimbursement rates to institutions. Ethicists concerned with allocation of scarce resources have typically followed the same pattern: for example, by discussing whether health care is properly viewed as a commodity in the marketplace or by debating the kind of allocation rules that might fairly be adopted under conditions of scarcity.

In fact, neither of these abstract scenarios—free market incentives or "lifeboat ethics"—corresponds with the real-world decision conditions of health care policymakers. Decisions about limiting access to services at the margin are actually more subtle and less explicit than either the marketplace or the lifeboat. Severe limits can be, and are today, imposed on access by covert decision, without any public acknowledgment—for example, cutbacks in access to home health care.

Limiting Access. In principle, under collective provision and apart from the marketplace, we can effectively limit access, and costs, in three ways: one, by controlling demand (through eligibility requirements); two, by controlling supply (through defining types of services covered); and three, by production decision (through controlling the quality and intensity of services provided). The current geriatric health care system uses all three methods.

Method one: We can rely on geographic boundaries (for instance, provide access only to nursing homes within 50 miles).

Method two: We can exclude podiatry, flu vaccinations, or medical check-ups (as Medicare currently does).

Method three: We could allow reimbursement not only to physicians, but to less expensive caregivers, for the same service: for home visits, for example, by geriatric nurse practitioners as well as physicians. All three approaches have powerful implications for cost-containment and for access to care. Yet all three tend to be neglected by the conventional debate that pits "need" against "marketplace" as an allocation principle. If we want to move toward a more comprehensive system of geriatric health services, we will need to look more closely at these covert access-limit decisions (such as geographic distribution, available services, and levels of personnel providing service) embedded in concrete institutional structures.

Tinkering with the Boundaries of "Health Care." The approach I am suggesting is entirely different from simply accepting the existing configuration of services for business-as-usual, and then trying to figure out how to equitably or efficiently finance, or distribute, that configuration of services. This sort of incremental approach is what typically differentiates health policy analysis, which tends to be quantitative and concrete, from bioethics, which tends to be qualitative and abstract. The danger of policy analysis is that it too easily accepts the status quo and fails to confront the fundamental ethical questions. The danger of a bioethics approach is that it too easily passes into utopianism. The approach I recommend is not utopian, but rather incremental. It involves "tinkering at the margin," but tinkering with different margins than the ones we are accustomed to look at.

This difference becomes crucial when we go back to the very first point raised in this discussion: namely, how to define the boundaries of "health care" itself. What makes the allocation problem in geriatric health services so difficult is that the services involved are so heterogeneous. In many cases, they do not really comprise "health" services at all but other needed support services—housing or support for activities of daily living. Failing to confront the boundary problem creates grave difficulties when we look at the balance among the different kinds of health care services for the elderly.

To illustrate the appropriateness of using definitions and moral principles to determine health care policy at the margin, we can differentiate geriatric health care services into three broad categories: acute care services (publicly financed largely by Medicare); long term care (publicly financed largely by Medicaid); and mental health services (poorly financed by both private and public means). Allocation issues associated with all three services can be resolved by challenging the status quo with the philosophical standards of ethics.

Reforming Services for Acute Care. With acute care services, we face the dilemma that medical technology can increasingly provide incremental gains in life prolongation. A recent report, *Life-Sustaining Technologies and the Elderly,* by the Office of Technology Assessment (24), looked at issues involved with resuscitation, mechanical ventilation, kidney dialysis, artificial nutrition and hydration, and antibiotic therapy. The Report concluded that gains often come at great cost and with doubtful benefit—a point particularly relevant for those of very advanced age who have poor quality of life, by almost any standard. "Consider the efficacy and the cost" should become a principle for guiding choices on this margin.

Reforming Long-Term Care Services. With chronic illness and long-term care, typically "low tech" services, we have an entirely different set of problems. The difficulty, at bottom, is that long term care, as a health care service, cannot easily be distinguished from housing and from related social services. One difficulty is that, as we improve the quality and lower the user price of alternatives to institutionalization—for example, home health care—then utilization rates are likely to rise sharply. In this respect, nursing home admissions are more comparable to acute care procedures: access tends to be self-limited to those in extreme need. The blunt fact is that old people do not like to enter nursing homes. They may be convinced that a nursing home is the best alternative, which it may well be, especially if public funds will pay for institutional care but not for day care, home care, respite services, or other preferable supports.

Correcting the present bias toward institutionalization involves facing the moral hazard of home care services, namely, the risk of enormous potential demand. The moral standard which emerges from this context might be "avoid creating inappropriate demands."

Reforming Mental Health Services. The mental health services can also illustrate the fittingness of moral principles in making health care decisions at the margins. The public system of provision has had a scandalous record of failing to respond to the mental health needs of the elderly. If genuine mental health problems are ignored, however, serious depression or other disabling conditions can result. On the other hand, "mental health" cannot be defined so broadly that it becomes an open-ended intervention to improve life satisfaction. If we move geriatric mental health services in that direction there will be no limits to how far we will "medicalize" the problems of old age, with all the attendant problems of expense and allocation of scarce resources. Here again, we see the centrality of definition in reforming health policy.

Rethinking Fundamentals. The result of these problems of boundary definition and moral hazard is that American health care for the elderly has been skewed drastically in favor of acute care interventions and nursing home placement. The vast bulk of Medicare and Medicaid funding for the elderly goes into these two kinds of services. The public and private service systems are reluctant to provide coverage for other long-term care needs and for mental health problems, despite clear evidence of need in both these areas. What is worrisome is that in our present era of obsession with cost-containment, discussions of equity and access will remain confined to debates about grand principles (the market versus need) or else get bogged down in timid, incremental modifications of the status quo. The result, in either case, is a kind of policy paralysis that maintains the present bias toward acute care interventions and nursing home placement—muddling through, as we have done in the past.

But muddling through has ethical dangers of its own. In this paper I have argued that a challenge to the present pattern requires more than opting for grand principles or technocratic policy changes at the margin. It requires rethinking fundamental presuppositions about justice, access, and limits in ways that might permit us to redesign health care provision for an aging society. It does not seem unreasonable to expect that a more thoughtfully designed system could address the needs of both young and old and also contain costs at acceptable levels of quality. Other advanced industrialized nations have such health care systems in place. Moving in that direction requires comprehensive planning and financing, as well as acknowledgement of the equity problems we presently confront. To succeed in fashioning rational and equitable policies we must be prepared to talk, unambiguously, about both access and limits in a publicly defensible way.

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Unlimited Entitlement to Health Care: The Dilemma of Narcotic Dependency

Barry Stimmel, M.D.

The narcotic addict is viewed as a pariah in our society. The means by which an addict obtains support for his or her habit, the public's perception of the environment in which narcotics are usually injected, and the addict's personal appearance all contribute to the frequently voiced perception that society would be better without such individuals. Some have even gone so far as to suggest that initiation of a program to accomplish this objective would be far from unreasonable. It is unfortunate that physicians, when confronting the narcotic addict in a medical setting, all too frequently share such views. Inevitably an adversarial relationship develops between physician and patient, and a power struggle commences almost on contact, usually focused on the need for narcotic analgesics, either to relieve pain or to prevent withdrawal. It is, therefore, not surprising that in the current climate of cost control concentrating on cost-effective services, the issue of whether to treat and how much care should be extended to the narcotic addict would arise.

However, negative feelings toward narcotic use are relatively recent. Indeed, in the 19th century opium was readily available throughout the country and quite prevalent, especially among the large numbers of Chinese laborers brought in to help build the railroad (1). Little concern over use of opium by the Chinese existed until they became part of the labor surplus in the Depression. Channels for distribution of opium included over-the-counter preparations, liberal dispensing by physicians, and even distribution in grocery stores. In 1906, the American Medical Association actually approved heroin for general use, recommending its effectiveness in treating morphine dependence (2). The medical profession considered heroin to be almost ten times as effective as morphine, with one-tenth of its toxicity and none of its dependency-producing effects. As is now known, the initial reports on heroin were far from accurate. Over the ensuing decades, more and more concern began to be expressed over the use of narcotic substances, even when indicated in medical practice.

This paper explores the severe medical complications incurred by those who use illicit drugs, the cost of providing care, and whether such costs are justifiable. Finally, the argument is advanced that the issue of provision of medical care to the narcotic addict is really irrelevant. The major philosophical discussion must center on whether society should bear the medical costs associated with willful, self-destructive behavior. When put in this context, the answer to the question of care for the narcotic addict will become far less clear.

Medical Complications and Heroin Addiction

The narcotic addict who illicitly injects heroin is indeed subject to a great variety of medical complications (see box), the most serious being death due to an acute fatal reaction. In the early 1970s, the acute fatal reaction was of particular importance, being the leading cause of death in young men between the ages of 18 and 30 in the City of New York (3). Ironically, the acute fatal reaction is really not of concern for our discussion, because it is not associated with any increase in medical expenditures and, perhaps for this reason, has been viewed rather benignly by society. Indeed, except for acute fatal

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Medical Complications Associated with Intravenous Drug Use

Acute fatal reaction

Allergic and pyrogenic reactions

Cardiovascular: hypotension, arrhythmias, endocarditis, mycotic aneurysm, necrotizing angiitis, suppurative thrombophlebitis
Dermatologic: abscesses, pruritis, urticaria, chronic lymphomas, ulcerating necrotizing nodulus, occlusive thrombophlebitis
Endocrine: disturbances in glucose metabolism and thyroid function, gynecomastia, sexual dysfunction
Genitourinary: hematuria, nephrotic syndrome, renal failure
Gastrointestinal: delayed gastric emptying, diminished gastric and small intestine motility
Hepatic dysfunction: acute hepatitis, chronic hepatitis, liver failure
Hematologic–immunologic: anemia, lymphadenopathy, disturbances in immune function, acquired immune deficiency syndrome

Tetanus–Malaria

Neuromuscular: coma, seizures, hemiparesis, demyelination, neuropathy, crush syndrome, chronic brain damage, peripheral myopathy, myositis
Respiratory: asthma, acute pulmonary edema, pulmonary vascular hypertension, tuberculosis, septic pulmonary emboli, nonspecific pneumonias

reactions specifically due to a pharmacologic overdose, all the complications associated with illicit heroin use are related not to the pharmacologic effects of the drug but rather to the manner in which it is used.

Before one immediately advocates legalization of heroin, it is sobering to consider that in England, where indeed heroin is dispensed legally, complications associated with its use are no less frequent. These complications are related to the psychopathology associated with heroin use, which leads the addict to purposely contaminate heroin through mixture with other agents, as well as to share needles. This last phenomenon may be of particular importance in view of the recent recommendation by the Commissioner of the City of New York that sterile needles be distributed to addicts in an attempt to prevent the transmission of the human immunodeficiency virus (HIV). Although the recommendation was put into practice in 1988, community opposition to specific sites for the needle exchange program and addict resistance to the program appear to be vitiating its effect on the spread of HIV.

Medical complications associated with narcotic addiction, however, are once again increasing in New York City. The number of addicts dying of nonspecific pneumonias in 1985 was 252, compared to 39 in 1980, an increase of over 500%. Similarly, endocarditis deaths increased from 31 to 92, a 190% increase. (Commissioner Steven Joseph's remarks to New York Academy of Medicine, December 17, 1986.) The reasons for this are less than clear, because the number of drug overdose deaths has remained relatively constant over this timeframe.

Endocarditis. Of the many complications associated with illicit, intravenous drug use, the two responsible for the greatest cost to society are endocarditis and the acquired immune deficiency syndrome (AIDS). Endocarditis has long been a recognized major complication of intravenous drug use, second only to AIDS in morbidity and mortality. Although it is difficult to estimate the prevalence of endocarditis among heroin addicts, the condition has been reported to be present in 20% of admissions for infectious complications of heroin dependency and 9% of all general hospital admissions in heroin users (4). Endocarditis is responsible for prolonged admissions to medical services and, not infrequently, for open heart surgery in order to replace infected valves.

It is a rare cardiothoracic service that does not have a narcotic user return after prosthetic valve replacement with a reinfection of the valve due to recurrent narcotic use. The question then arises whether it is appropriate to continue to replace a valve when an individual shows no care or concern for his or her health through repeated injection of illicit substances.

The nationwide cost for treatment of endocarditis is not known. This condition is rated among the highest of the DRG relative weights and has the longest mean hospital stay (23 days). When valve replacement is needed, the relative weights increase by almost 50%, and the length of stay is extended even further. Translated into costs: an average case of endocarditis treated medically costs approximately $14,000. If surgery is needed, a cost of $24,800 is incurred.

Acquired Immune Deficiency Syndrome. Although no good nationwide figures are available on the actual costs incurred in treating endocarditis in heroin addicts, data on cost of treating addicts who become AIDS patients are. From June 1981 to December 1986, over 28,000 persons in the United States were reported as having AIDS (5, 6). It is estimated that during 1986 and 1987, 40,000 persons will develop this disorder and by 1991, empirical models predict a cumulative case total of 270,000, of whom approximately 20% will be intravenous drug abusers. In New York City, approximately 35% of AIDS cases are related to intravenous drug use, and it is estimated that at least 50% of the city's 200,000 drug users are infected by HIV. Of children born with AIDS, 80% have acquired their disease from either a mother who used intravenous drugs or through transmission of HIV to the mother from an infected father (5, 7).

A study by Hardy et al. on the first 10,000 patients with AIDS reported in the United States suggests that these persons will require an estimated 1.6 million hospital days, resulting in over $1.4 billion in medical care expenditures and losses of over $4.8 billion stemming from years of work lost because of disability and premature death (8). Approximately $147,000 will be spent for the hospital care of each patient with AIDS, exclusive of outpatient care, medications, and social care costs. Recently, the Commissioner of Health in New York City suggested that there were 500,000 people in the city infected with HIV. It has been estimated that 30% of those infected will develop AIDS (6). Should this be correct, in New York City alone the cost for medical care of AIDS patients will reach $42 billion, or almost 10% of what our country is currently spending a year for all health care.

Who will pay for this? Clearly not those afflicted with the disorder, but society as a whole. Are these costs justifiable, especially when those afflicted continue to engage in high-risk practices, or should a line be drawn for decisions on whether to render treatment?

TABLE

Reported Cases of Acquired Immune Deficiency Syndrome Through 8 December 1986

	No.	(%)	Increase 1985–1986 (%)
Homosexual/bisexual	18,162	(67)	57
Intravenous drug use	6,888	(25)	53
Hemophilia/coagulation disorder	240	(1)	39
Heterosexual contact	485	(2)	132
Transfusion	505	(2)	80
Undetermined	829	(3)	95
TOTAL	27,109		

The Real Issue: "Acceptable" vs "Unacceptable" Self-Destructive Behavior

With respect to the narcotic addict, some people find it easy to draw that line and make that decision. Arguments have been made against recurrent surgery for infected valves as well as for a somewhat less than humane or comprehensive approach in treating severe medical complications in the addict, based on the illness being self-induced, and on the likelihood that the addict will return to the streets and then, once again, have to return to the hospital.

This argument, however, is rarely ever raised with respect to other self-destructive acts responsible for far greater societal costs. As an example, inhalation of tobacco smoke during active cigarette smoking remains the largest single, preventable cause of all deaths and disability in this country, being extensively documented as responsible for more than 300,000 premature deaths a year due to cancer and heart disease, to mention but two complications associated with smoking (9). Similarly, alcoholism is responsible for an enormous degree of medical disability due to liver disease and cardiomyopathy. The public's perception of the dangers of alcohol and tobacco use is great. Education on the untoward effects of these substances is promoted and funded by both public and private sectors. Yet a proposal to ban either would not carry the day, and rarely is a question raised on whether to treat an emphysematic who continues to smoke, or whether to resect a bronchogenic carcinoma in an individual who has for years ignored his or her physician's advice.

Even with the appearance of AIDS in populations not previously thought to be at risk, the arguments hold. Heterosexual transmission of HIV is becoming more prevalent (Table). Increasing numbers of women are acquiring AIDS from men infected with HIV. Recent anecdotal evidence suggests that even when the woman knows her partner carries the virus, appropriate precautions are not always taken. Is this not truly self-destructive?

Clearly a distinction is made between "acceptable" and "unacceptable" self-destructive behavior. This bias must be addressed. Whether society should pay for the complications of self-destructive behavior is a valid question; however, if one follows this approach, where one should draw the line on behavior that would preclude treatment is less than clear. Should complications of obesity relating to overeating be included? What about the diabetic who becomes acidotic for failing to take insulin? What of the cardiac patient who chooses not to take the diuretic, to consume too much salt, or to inappropriately engage in strenuous exercise? These acts are all self-destructive and may, in fact, be accompanied by equally severe and costly medical complications.

The question thus becomes more difficult and less amenable to a facile response. However, when health care resources become limited, priorities have to be set. This has been done in many countries, England being the most notable. By revising criteria for dialysis and renal transplantation and by limiting the number of open heart procedures per community per year, England has answered the question, Who shall live? It is to be hoped that through efficient use of resources, this country can delay making such decisions. If not, and if we must define priorities, we should do so in as rational and unbiased a manner as possible.

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Cost Containment and Justice

NORMAN DANIELS, PH.D.

To begin with a brief anecdote: Recently, a friend of mine confided to me that he is not sure he will be able to continue practicing medicine if current trends in the health care system continue. He complained that various reforms—actual and proposed—in the financing of health care make him feel that he will not be able to remain the unbiased agent or advocate for his patient. He feels that he has always been such an advocate and that medical ethics requires him to be one. To represent his patient's best interests, he feels he must be free to make medical decisions aimed at the best treatments and outcomes that are medically possible for his patient. He feels he cannot in good conscience comply with hospital pressures to discharge his Medicare patients before he thinks they are ready. He finds repugnant a recent capitation scheme proposed for physicians at his hospital. Under the plan, the doctor would be financially rewarded for not ordering certain diagnostic tests or consultations. He insists these are threats to his "moral character" and to his "psyche" as a physician. Like many other physicians, he believes that the "old" retrospective fee-for-service schemes facilitated acting as the unfettered agent of the patient, but that cost-containment schemes destroy morally essential features of the doctor-patient relationship by restricting physician autonomy.

My friend's concerns are worth examining. Does he feel that any rationing of beneficial health care services violates what we might call the ethic of agency? Or is his complaint primarily aimed at features of recent reforms in the United States? In my remarks here I try to highlight and argue for several theses in response to his concerns.

Thesis One: Justice Requires Rationing. Because of scarcity and the inevitable limitation of resources even in a wealthy society, justice—however we elucidate it—will require some forms of rationing at both the macro and micro levels of allocation. To be sure, reasonable people can disagree about the degree and sources of the scarcity we face. Some, like John Bunker, think there is so much fat in the U.S. system that current measures will obviate the need for more stringent rationing (1). Others, like my colleague William Schwartz, predict that rationing will have to be made more explicit and more stringent (2). I will not resolve the dispute here. Instead, I rely on a more general claim: No plausible principles of justice will entitle an individual patient to every potentially beneficial treatment. Providing such treatment might consume resources to which another patient has a greater claim. Similarly, no class of patients is entitled to whatever new procedure offers them some benefit. New procedures have opportunity costs, consuming resources that could be used to produce other benefits, and other classes of patients may have a superior claim that would require resources to be invested in alternative ways.

How rationing works depends on which principles of justice apply to health care. For example, some people believe that health care is a commodity or service no more important than any other and that it should be distributed according to the ability to pay for it. For them, saying no to patients who cannot afford certain services (quite apart from whether income distribution is itself just or fair) is morally permissible. Indeed, providing such services to all might seem unfair to the patients who are required to pay.

I have argued for a different approach to just health care (3). I think health care derives its

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Largely based, with permission, on my "Why Saying No To Patients in the United States Is So Hard: Cost-Containment, Justice, and Provider Autonomy," N Engl J Med 1986; 314:1381–1383.

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moral importance from its effect on the normal range of opportunities available in a society. This range is reduced when disease or disability impairs normal functioning. Since we have social obligations to protect equal opportunity, we also have obligations to provide access, without financial or discriminatory barriers, to services that adequately protect and restore normal functioning. We must also weigh new technological advances against alternatives, to judge the overall effect of their introduction on equal opportunity. This gives a slightly new sense to the term "opportunity cost." As a result, people are entitled only to services that are part of a system that on the whole protects equal opportunity. Thus, even my egalitarian theory, which holds health care is of special moral importance, justifies rationing at both the macro and the micro levels.

Thesis Two: The Ethic of Agency Is Compatible with Just Rationing. Rationing—when it is part of a just health care system—does not violate the ethic of agency. If this is true, we have gone some way toward answering the questions raised by my friend. Consider rationing in another society, one which pays close attention to important issues of justice in the design of its health care system. Aaron and Schwartz (4) document how beneficial services and technologies have had to be rationed within the British National Health Service, since its austerity budget allows only half the level of expenditures made in the United States. The British, for example, use less x-ray film, provide little treatment for metastatic solid tumors, and offer renal dialysis only to the young. Saying "no" to beneficial services takes place at both macro and micro levels.

Rationing in Great Britain takes place under two constraints which do not operate at all in the United States.

First, although the British say "no" to some beneficial care, they nevertheless provide universal access to high-quality health care. In contrast, over 10% of the population in the United States lacks insurance, and race differences in access and health status persist.

Second, saying "no" in Great Britain takes place within a regionally centralized budget. Decisions about introducing new technologies involve weighing the net benefits of alternatives within a closed system. When a technology is rationed, it is clear which resources are available for alternative uses. When a technology is widely used, it is clear which resources are unavailable for other uses. No such closed system constrains American decisions about technology dissemination, except, on a small scale and in a derivative way, within some health maintenance organizations.

These two constraints are crucial to justifying British rationing. The British practitioner who follows standard practice within the system does not order the more elaborate x-ray diagnosis that might be typical in the U.S., possibly even despite the knowledge that additional information would be useful. Denying care can be justified as follows: "Though the patient might benefit from the extra service, ordering it would be unfair to other patients in the system. The system provides equitable access to a full array of services which are fairly allocated, according to professional judgments about which needs are most important to meet." The salve of this rationale may not be what the practioner uses to ease her qualms about denying beneficial treatment, but it is available.

A similar rationale is available at the macro level. If British planners believe alternative uses of resources will produce a better set of health outcomes than introducing coronary bypass surgery on a large scale, they will say "no" to a beneficial technology. But they have available the following rationale: "Though we would help one group of patients by introducing this technology, its opportunity cost is too high. We would have to deny other patients services which are more important to provide. Saying 'yes' instead of 'no' would be unjust."

These justifications for saying "no" at both levels have a bearing on physician autonomy and on moral obligations to patients. Within the standards of practice determined by budget ceilings in the system, the British practitioner remains autonomous in his clinical decision-making. He is obliged to do the best possible for his patient within those limits. Most importantly, his clinical judgments are not made "impure" by giving him or his institution profit incentives to deny care. What I am calling the ethic of agency requires that physician decisions be "pure" in the following sense: they must be free from consideration of the physician's interests and they must be uninfluenced by judgments about the patient's worth. Just institutions which ration care can respect this purity requirement.

The claim made here is not that the British National Health Service is just, but that considerations of justice are explicit in its design and in decisions about the allocation of resources. Because justice plays this role, British rationing can be defended on grounds of fairness. Of course, some "no"-saying, such as denying renal dialysis to elderly patients, may raise difficult questions of justice (see 5). The issue here, however, is not the merits of each British decision, but the framework within which those decisions are made.

Thesis Three: The Ethic of Agency Is Threatened by U.S. Cost-Containment Measures. Cost-containment measures in the United States reward institutions, and in some cases practitioners, for delivering treatment at a lower cost. Hospitals which deliver treatment at less than the DRG rate pocket the difference. Hospital administrators therefore scrutinize the utilization decisions of physicians, pressuring some to deny beneficial care. Many cannot always act in their patients' best interests, and they fear worse effects if DRGs are extended to physician charges. In some health maintenance organizations (HMOs) and preferred-provider organizations (PPOs), there are financial incentives to the group to shave the costs of treatment, if necessary by denying some beneficial care. In large HMOs, where risks are widely shared, denial of beneficial care may be no greater than under fee-for-service reimbursement. But in some capitation schemes, the individual practitioner is financially penalized for ordering "extra" diagnostic tests, even if he feels his patient needs them. More ominously, an ABC television program reported that the Paracelsus Corporation offered physicians in its hospitals a share of the profits made from the early discharge of Medicare patients.

Where economic incentives to physicians lead them to say "no" to beneficial care, there is a direct threat to the ethic of agency. In general, granting a physician considerable autonomy in clinical decision-making is necessary if he is to be effective as an agent pursuing his patients' interests. The ethic of agency constrains this autonomy in ways that protect the patient, requiring that clinical decisions be (a) competent; (b) respectful of patient autonomy; (c) respectful of other patient rights, such as confidentiality; (d) free from consideration of the physician's interests; and (e) uninfluenced by judgments about the patient's worth. Incentives which reward physicians for denying beneficial care clearly risk violating constraint (d), which, like (e), is intended to keep clinical decisions "pure," that is, aimed at the patient's best interest.

Rationing need not violate the purity constraint (d). British practitioners are not rewarded financially for saying "no" to their patients. Because our cost-containment schemes give incentives to violate this constraint, however, they threaten the ethic of agency. A patient would be foolish to think the physician who benefits from saying "no" is any longer his or her agent. (Of course, patients in the United States traditionally have had to guard against unnecessary treatments, since reimbursement schemes provided incentives to overtreat.)

The American physician faces a problem even when the only incentive to deny beneficial care is to his hospital, not him. For example, how can he justify sending his Medicare patient home earlier than he thinks is best? Can he, like his British peer, claim that justice requires him to say "no" and that therefore he does no wrong to his patient?

The American physician cannot make this appeal to the justice of saying "no." He has no assurance the resources he "saves" will be put to better use elsewhere in the health care system. Reducing a Medicare expenditure may only mean there is less pressure on public budgets in general, and thus more opportunity to invest the savings in weapons. Even if the savings will be freed for use by other Medicare patients, he has no assurance they will be used to meet the greater needs of other patients. The American health care system, unlike the British, establishes no explicit priorities for how resources are to be used. In fact, the savings from saying "no" may be used to invest in a technology that may never return care of comparable importance to what the physician is denying his patient. In a for-profit hospital, the profit made by denying beneficial treatment may be returned to investors. In many cases, the physician can be quite sure that saying "no" to beneficial care will lead to greater harm than providing the care.

Saying "no" in the United States at the macro level faces similar difficulties. A hospital deciding whether to introduce a transplant program competes with other medical centers. To remain competitive, its directors will want to introduce the new service. Moreover, they can point to the dramatic benefit the service offers. How can an opponent of the transplant program respond? He may (correctly) argue that it will divert resources from other projects that are perhaps less glamorous, visible, and profitable, but nevertheless offer comparable medical benefits to an even larger class of patients. He insists the opportunity costs of the new technology are too great.

This argument about opportunity costs, so powerful in the British National Health Service, loses its sting in the United States. The alternatives to the transplant program may not constitute real options, at least in the climate of incentives that exists in America. Imagine someone advising the Humana Hospital Corporation, "Do not invest in artificial hearts, for you could do far more good if you established a prenatal maternal care program in the catchment area of your chain." Even if correct, this appeal to opportunity costs is unlikely to persuade Humana, not because Humana is greedy, but because it responds to the incentives society offers. Artificial hearts, not prenatal maternal care programs, will keep its hospitals on the leading technological edge, and, if made popular, will bring far more lucrative reimbursements than preventing low-birth-weight morbidity and mortality. The for-profit Humana, like many nonprofits, merely responded to existing incentives when it introduced transplant programs during the early 1980s, at the same time prenatal care programs lost their federal funding. Similarly, cost-containment measures in some states led to cutting social and psychological services but left high technology services untouched (6). Unlike his British peer, the American planner cannot say, "Justice requires that we forego this technology because the resources it requires will be better spent elsewhere in the system. It is fair to say 'no' to this technology because we can thereby provide more important treatments to other patients."

The failure of this justification at both the micro and macro levels in the United States has the same root cause. In our system, saying "no" to beneficial treatments or technologies carries no assurance we are saying "yes" to even more beneficial ones. Our system is not closed, for the opportunity costs of a treatment or technology are not kept internal to it. Just as important, the system as a whole is not governed by a principle of distributive justice, appeal to which is made in decisions about disseminating technologies. It is not closed under constraints of justice.

Thesis Four: There Are Both Good and Bad Consequences of U.S. Cost-Containment Measures. The bad news first: Providers in the United States cannot console themselves that denying beneficial care is nevertheless fair to their patients. Because this appeal to the justice of denying care is not available, many physicians are left feeling as my friend does. They correctly feel that current measures interfere with their duty to act in their patients' best interests. Of course, physicians should not think that duty requires they accept no resource limitations on patient care. But it is legitimate for physicians to hope they may act as the advocate of their patients within the limits allowed by the just distribution of resources. Our cost-containment measures thus frustrate a legitimate expectation about what duty requires. Eroding this sense of duty will have a long-term destabilizing effect.

Here is more bad news: The absence of a rationale based on justice also affects patients. Resource constraints mean each patient can legitimately expect only those treatments due him under a just or fair distribution of health care services. But if beneficial treatment is denied even when justice does not require or condone it, then the patient has reason to feel aggrieved. Patients will not trust providers who put their own economic flourishing above meeting patient needs. They will especially distrust physicians in schemes which allow doctors to profit by denying care. Conflicts between the interests of patients and physicians or hospitals are not a necessary feature of a just system of rationing care. The fact that such conflicts are central in our system will make patients suspect there is no one to be trusted as their agent. In the absence of a concern for just distribution, our cost-containment measures may make patients seek the quite different justice of tort litigation, further destabilizing the system.

Now for the good news—or perhaps I should say, high hopes. As a result of cost-containment measures, physicians have come to understand more about their place within the institutions that deliver health care. They have lost many of their illusions that they are just individual entrepreneurs delivering a service on their own terms, with reasonable control over the quality of the product. There is a risk here: physicians may hanker for the old arrangements, but this is a lost cause. I hope that this increased understanding by physicians of their place within a health care system will make them allies of efforts to make the system more just, for only if the system is made more just can their integrity within the doctor-patient relationship be preserved.

I am pointing here to a much deeper issue. Economic incentives such as those embedded in current cost-containment measures are not a substitute for *social* decisions about health care priorities and the just design of health care institutions. These incentives to providers, even if they do eliminate some unnecessary medical services, will not ensure that we meet the needs of our aging population over the next several decades in a morally acceptable fashion, and they will not ensure that we make effective—and just—use of new technologies. These hard choices must be faced publicly and explicitly. I am hoping that physicians who have come to see the inevitability of their loss of autonomy will seek to convert that loss from a change for the worse into a change in the direction of a more just health care system.

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Hard Data on Efficacy:

The Prerequisite to Hard Choices in Health Care

ARTHUR L. CAPLAN, PH.D.

Let me begin with two stories about the way things are in health care today. I give many talks about the ethical issues which arise with respect to professional autonomy and the role physicians and other health care professionals play as patient advocates under the new economic constraints imposed in the name of cost-containment. Not infrequently my talk is followed by one given by a person who carries a big case full of software. This person gives a talk about how to beat the system of prospective payment instituted in Medicare and some state Medicaid programs. Health care providers are concerned about medical ethics, but they are even more concerned about the battering their bottom line is taking in many institutions. And concern about the costs of health care are not confined to the lecture hall.

Recently, the chief resident at the University of Minnesota Hospital told me about a case that was troubling the housestaff. A young woman who had a long history of intravenous drug abuse and prostitution had recently been admitted to the hospital. She was suffering from endocarditis, a bacterial infection that was damaging the valves of her heart. She had already undergone one heart valve replacement in Texas as a result of this disease. The cost for that procedure was over $75,000. When she appeared at the same hospital in Texas with the same condition a few years later, the hospital told her that they would not perform another operation.

Despondent, she came back to her home state, Minnesota, to seek a valve replacement. Some of the housestaff saw things exactly as had the doctors in Texas. She had clearly gotten reinfected because she was still sharing needles. Why should they perform an expensive operation on a woman who, in the words of one resident, "would just go out and do it all over again"?

Experiences such as these have left me with some sympathy for the view that it is nice to talk about ethics, but it is more important to understand how things actually are in our hospitals, nursing homes, and emergency rooms today. In some areas of the nation, harm is being done because doctors and administrators are overly concerned with costs. In other places hospitals and physicians seem to be more concerned with administering morality tests to their patients than they are in helping them.

There are three points I would like to raise to show that bioethics does have something to say about the practical world. I want to make a specific recommendation about cost containment and equity. I also want to draw a philosophical distinction between allocation and rationing. I will also argue that we all ought to be willing to pay for the medical care of others, even when such payment is not for our own benefit and when those needing care may have contributed to their being sick or disabled through their own behavior.

The Concept of Obligation. Why should we care what happens to poor people or those who might in another era have been described as sinners? One response, which has gained numerous adherents in recent years, to those who engage in unsafe sex, fail to wear helmets while operating motorcycles, or drink to excess is "to hell with them." Some believe that the ethically responsible public policy response to the health care plight of the imprudent or the unfortunate can be formulated along something like the following lines: "Too bad, you probably deserve your

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problems. It's not my problem. Get out of my way, I'm coming into Mount Sinai to get a facelift or a tummy-tuck."

The response to the medically indigent and morally fallible in our society is not always one of empathy or sympathy for the plight of others. Perhaps morality can be used to generate a feeling of obligation to help which might not be present when we confine our response to a close examination of the contents of our wallets. Unfortunately, talk of obligations is not much in evidence in our current political policy debates about health care.

When Can the Concept of Rationing Be Invoked? Let me begin the examination of the concept of obligation with an examination of a crucial concept in health policy today: rationing.

One of the ways in which we allow rhetoric or ideology to overwhelm us is by being incautious about what the concept of rationing really means. Rationing, to the economist, simply describes any situation in which one has to divide a supply of resources amongst people who all want access to the resources. But this somewhat sterile description does not capture what rationing really entails, at least in the sense in which it is invoked in health policy rhetoric these days.

The rhetoric of health care cost containment these days is more akin to the ethic of the lifeboat, not discussions of marginal utility or whether we can ethically take away incremental benefits from someone. What people are talking about in academic circles, in Congress, in the Office of Management and Budget, in state legislatures, and in popular books such as those written by former governor of Colorado Richard Lamm and former Health and Human Services Secretary Joseph Califano is witholding access to life-saving or life-extending medical care (1–4).

There is a growing school of thought which runs, "Our nation is in a tough situation. We've got to gird up our emotional loins and be prepared to eject some of our fellow citizens from the health-care lifeboat. They are draining us of resources that we need to continue our economically sound voyage in competing in the world marketplace."

According to many analysts, the United States is currently facing a dire emergency. We are in a situation of lifeboat ethics with respect to health care. The moral question, and the only important moral question, is, What rules can we agree upon to guide us in answering the question of who to toss over the side?

Answering this question is, by the way, highly lucrative labor for bioethicists. People feel much better about what it is they have to do if they can defend their triage policies in moral terms.

Rationing as a Subset of Allocation Issues: The Lifeboat. Rationing should be seen, from a moral point of view, as a very special and distinct subset of allocation issues. It is a particular and dire instance of what is permitted in responding to scarcity. Rationing should be used only to describe choices, not about marginal utilities or incremental benefits, but rather choices that require excluding some persons from life-saving benefits. Rationing applies in very particular circumstances. The clearest paradigm is the lifeboat.

On a lifeboat when scarcity exists there is nothing anyone can do to get more resources. In a lifeboat one simply cannot get any more food or water.

Furthermore, those on a lifeboat know, and there is no dispute about the fact, that the resource they need is required in order to live. You know that you must have food and water, not to feel better, but to live. You know that if you don't get food, or water, you will die.

On a lifeboat everyone wants the food and water that are available. There is no lifeboat ethics scenario if some passengers voluntarily decide to forgo access to food and water and die. The agony of rationing arises when all aboard want access to the resources that are available.

It is also true, if one is stuck in a lifeboat, that there is not enough food and water to go around. This is a special, an extreme, form of scarcity. Resources cannot be shared below a minimal portion, since to go below the minimum will do no one any good. Unlike bubblegum or sunshine, no one can make do with a small portion.

These conditions are prerequisites for rationing to exist on a lifeboat. There is a shortage of a life-supporting, life-sustaining resource. Everybody would want it if they could have access to it. There's nothing anyone can do to get any more of the resource. There's not enough of it to go around; the resource is nondivisible.

Admittedly rationing is sometimes needed. Some people, for instance William Schwartz and Henry Aaron in their widely hailed book, *The Painful Prescription* (5), think you have to go to England to find real cases of rationing in health care. But there is no need to travel so far.

Rationing policies must be instituted in many areas of health care in the United States and have been for many, many years. Large American transplant centers must allocate organs and tissues among more recipients than there are organs and tissue available. And, in many American rehabilitation departments, there are many more people with spinal cord injuries and head trauma who want access to rehabilitation than there are facilities that can provide these services.

Rationing of Organ Transplants. What has been the American response when confronted with scarcity of such dimensions with respect to a life-sustaining resource that rationing is required? Consider the policies that have evolved in the field of organ transplants.

Ability to Pay and Age. The American response has been to use the ability to pay to ration access. There is not a major transplant center in the United States which does not require a means test for those seeking liver, pancreas, bone marrow, heart-lung, or lung transplants.

Our policy has also been to look very carefully at age. Age is used as a criterion every day. Transplant centers and transplant surgeons who say that 55 is too old for a liver transplant, or 65 is the age at which we will not give access to a heart transplant, are doing so on more than purely medical grounds. They are simply saying they have to adapt to a situation in which a life-saving resource is scarce and many people want it. Their response is to consider money. They think about age. What else do they do?

Efficacy and Selection Criteria. What doctors also think about in making rationing choices is the degree to which a procedure is known to work. There's a tendency to want to discourage access to some transplants in situations in which they have a poor chance of succeeding in preserving life.

Consider the notorious Baby Jesse case in California. A little girl was born with a heart defect. It was alleged that she was refused a transplant because she was the product of unmarried bliss.

But that is not at all what happened. What was going on was that the physicians and social workers looked at the baby's family and decided they might not be competent to care for the baby if the surgery was done. So they did not admit the baby to the program. This kind of psychosocial judgment is based upon the need to ration. Provide more organs and more transplant centers capable of transplanting newborns, and psychosocial evaluations would be far more generous.

For new forms of transplantation, other values emerge. In rationing access in a new transplant program or for a new form of transplantation such as pancreas or lung transplants, doctors keep an eye over their shoulder to insure that their procedures have some degree of efficacy. They are also concerned to show that they are not going to kill patients at higher rates than other programs.

Those rationing access to the total artificial heart in Utah and Louisville, Kentucky kept upgrading the level of people in whom the hearts were inserted. Originally total artificial hearts were to go to those who could not be resuscitated during open-heart surgery. Later the criteria for admission were extended to include those with cardiomyopathy. Later still, additional criteria were added having to do with the psychological, social, and familial attributes of potential recipients.

The researchers argued (and continue to argue) that they needed people who were not quite so sick because the less ill would do better on the device. The same pattern of selectivity is in evidence in all other forms of transplantation. The health of patients is a factor much in evidence in rationing access to new medical treatments. There is a real need to show that new technologies work and that they're safe. Researchers triage access knowing that safety and efficacy must be demonstrated.

A slew of values come into play in the "real" world to govern rationing. Those trying to replace damaged organs look at the ability to pay, age, the health of potential recipients, and psychosocial factors in making their choices.

Access to Dialysis in America and the United Kingdom. These same values are evident in the access patterns for hemodialysis in the United States and the United Kingdom during the past thirty years. It is particularly interesting to note the similarities in access patterns, given all the ballyhoo about the lessons on rationing we ought to learn from the British.

The availability of payment for dialysis in England made little difference to who got dialysis in the 1960s. Prior to our decision to create the End-Stage Renal Dialysis program, and thus guarantee financial coverage for dialysis for those in end-stage renal failure, our distribution patterns were about the same as the United Kingdom's. The decision to pay for dialysis in 1972 was followed by a rapid expansion in the use of dialysis in the United States. But access to dialysis in the United Kingdom also underwent a rapid increase in the years following the American financing decision.

These similarities occurred because the other values just mentioned in the analysis of transplantation overwhelmed the fiscal incentives to provide or not provide the treatment. The primary value for the British nephrology community in the mid to late 1960s was making sure that the dialysis machine worked. They wanted to make sure that hemodialysis did not kill people faster than would happen by doing nothing. They were also trying to show that hemodialysis was better than doing kidney transplants.

These concerns determined the selection criteria that produced a dialysis population in England of people roughly 30 to 45 years old, who had a job, were psychologically stable, had few other diseases, and had a stable family. These early rationing criteria penalized the usual suspects. The poor, minorities, the drug addicted, the mentally ill, the elderly, the chronically ill, people who did not speak English, all dropped by the wayside because they were much tougher to work with in terms of obtaining good outcomes with a new technology.

American nephrologists also had a population of patients in the early and mid 1960s who were young or middle-aged, relatively healthy, middle and upper class, and in good mental health. Money was not the driving force in determining access to scarce hemodialysis machines, although it too played a role. The need to prove that the technology could work was the overriding moral norm that governed rationing during this period.

Specifically American Values at Work in Selection and Rationing. The same thing is true in other relatively new areas of health care. Decisions about who to admit to a rehabilitation unit for head injury or stroke victims frequently depend on who in the attending physician's judgment is likely to benefit the most from access to rehabilitation. Rationing has relatively little to do with need, because nearly all stroke and head injury patients need rehabilitation. Rationing has to do with who is seen as most likely to show the greatest improvement relative to other people the physician could admit. Decisions are oftentimes influenced by judgments about the degree to which a patient is motivated to strive for rehabilitation, their residual capacity to go back to independent living, and to go back to work.

The emphasis on work and independent living is interesting in the rehabilitation setting, since these are quintessentially American values. Other societies do not assign them the same weight that our physicians and third-party payors do.

Independence is the dominant value that we seem to care about, but we would have a hard time persuading many others in the world to care all that much about it. Work has an even more peculiar status. We are so enamored of the value of work in rehabilitation that we try to convince people to work who did not do so before they had their head trauma or stroke!

Many years ago I interviewed a man in a small acute-care rehabilitation facility. The staff complained bitterly that this fellow was noncompliant, he would not follow his rehabilitation regimen. He was particularly indifferent to his occupational and vocational therapy.

I was asked to go talk with him because no one else could figure out what to do with him. I asked him why he seemed uninterested in his rehabilitation. He said, "Well, I like to stare out the window and look at the construction going on across the street. That's what I like to do. And I don't want to do all these sorting tasks and licking envelopes and stuff that they're trying to make me do." I said, "Oh, what did you do before your accident?" He said, "Well, I hated working. I used to lie at home, stare out the window and watch construction." I am not quite sure how this fellow got past the triage screen for rehabilitation which placed so much weight on work, but I was sure he would not become a success if the only standard used to evaluate him was whether or not he returned to work.

Now whether our medical professionals should try to make people like this into something else as a result of the moral weight we put on work, I do not claim to know. But the values governing rationing in American health care are there for all to see if anyone really wants to see them. You do not have to travel to other places, other cultures, other societies.

My analysis of transplants, artificial organs, and rehabilitation leads me to claim that we have been rationing for quite some time in our society. And my analysis of the lifeboat case leads me to suggest that doctors, administrators, legislators, ethicists, nurses, bureaucrats, and ex-governors, and Secretaries of Health and Human Services ought limit their use of the term "rationing" to those situations in which life-saving resources are scarce, and in which we know that resources cannot be stretched any further, that the resources will indeed save lives, and that people want access to them. If these conditions are not met, a rationing scenario does not exist.

The Case for Inclusion, Not Exclusion, in Health Care. If this analysis is sound, then I do not believe a case can be made for instituting rationing throughout our health care system. There surely are areas of the health care system, such as organ transplantation or rehabilitation, in which rationing will be required now and for some time to come. But in large areas of health care we simply do not know whether access to resources is life-saving, much less beneficial in any way. And in too many cases we are giving care to people who have said they do not want it, or who would have said so had we instituted a public policy that would allow their voices to be heard when they cannot tell us what they want to do—in senility, coma, or mental illness.

If this is so, then we are under some obligation not to exclude people, but rather to include people in our health care system. Surely all ethical and religious traditions hold that minimal beneficence is required to save lives when it is possible to do so without risking one's own health or fiscal solvency.

When Is the Duty to Help Invoked? Without going through a lot of technical argument, let me end this paper with a sketch of an argument that would impose a duty of beneficence on anyone, provider or payor. If the following conditions are met I think an obligation to help exists. To do this I will again use a paradigmatic case—that of rescuing a drowning victim.

Suppose you are a competent swimmer on your way to your favorite swimming hole. It is a hot summer day so you are already attired in your swimming suit. As you saunter down the road you pass a small, shallow pond. A little girl is thrashing about in the pond calling for help. You glance around and there is no one else in sight. Are you obligated to help her?

The only possible answer is that you are. Why? Well, it is true that you do not know the girl. And it is true that you are not in any way responsible for her plight. Moreover, she may have fallen into the pond because of her own imprudent or negligent behavior. Nonetheless, you have an obligation to rescue her.

First, it is clear that she really is in need of help. And this is a standard requirement for any obligation to help; those seeking help must need it. Second, you know how to swim. You are even in your bathing trunks! The fact that she is shrieking things like, "Help, please help me," indicates not only a need but a desire for help. So a third condition for generating an obligation is met when the person in need wants help. And lastly, you can render aid without significant harm or peril to your own well-being. You are in your trunks, the pond is shallow, and you are on your way to go swimming anyway. When benefits can be given to those in need who want help with a minimum of inconvenience, benefits ought be given.

In health care settings there are many people who have failing heart valves, premature babies, a need for rehabilitation after head injury or organ failure. We are obligated to help them if competent diagnosis reveals real needs and the person wants our help.

A third condition must also be met. We must know, just as the man in his swimming trunks, that if we do attempt to help there is a reasonable chance of doing so. It does not do much good for would-be rescuers to jump into ponds when they cannot swim, and it does no good to provide medical care if it is not known that the care will do any good.

Hard Data on Efficacy Necessary for Any Decision on Rationing and Moral Obligation. Efficacy is at the heart of rationing and, as this argument makes clear, it is at the heart of obligations to assist as well. Yet our society spends more than $500 billion on health care while spending almost nothing to figure out whether any of it does any good. In discussions about whether our society should spend more or less on transplants or artificial hearts or prenatal care, or valve operations for addicts, or rehabilitation, or a thousand other things, no one can possibly decide because the data necessary for answering the question do not exist.

Unless hard data on efficacy exist, there is no way to derive a moral obligation to pay for providing medical care to others. All doctors, nurses, allied health professionals, social workers, third-party payors, trustees, and administrators can say is, we need a couple more billion for this or that, and it might help save lives. Or they can try to appeal to politicians through the deft use of the media by having photogenic patients beg, plead, and grovel in creative ways to elicit not a sense of obligation but a sense of charity.

What the medical professions, hospitals, nursing homes, institutions for the mentally ill, hospices, and health maintenance organizations should all be stanchly committed to is efficacy assessment, backwards and forwards, every day, all the time, for every procedure, be it diagnostic, palliative, therapeutic, preventive, rehabilitative or cosmetic. Efficacy holds the key to the proper understanding of rationing. It is also the basis for generating a sense of obligation to help or pay for helping others. Unless the health care field can prove that there is a need for their services, that people want them, that they have a good chance of meeting those needs and that the needs can be met without demanding total sacrifice from the society, it will have an extremely hard time persuading anybody to spend money for health care goods and services.

There is one last condition that needs to be mentioned in the context of the moral obligation to rescue or provide help to others. The degree of help being rendered does count.

To go back to my swimming case, if you are in your bathing suit not because you want to refresh yourself at the old swimming hole but because you are on your way to save many people who have had a boating accident, and happen to encounter our poor young girl in a swimming pond, then matters may be different. It does not make much sense to try to save the little girl if in doing so you forfeit the ability to save more people. If the odds of helping one are the same as helping more than one, then the weight of lives saved must be entered into the equation, other things being equal.

Few people would dispute the fact that we should not let the very real needs of a few overwhelm the ability of our health care system to provide for the very real needs of the many. But again, if there is no hard information about what does and does not work in health care, if doctors and nurses and allied health professionals are not certain whether an intervention has a high or a low probability of bringing about a benefit, then it will be very difficult to figure out what to do when conflicting demands for help exist. What is worse, without hard data every conflicting demand for help, for scarce health care dollars, looks insoluble.

If we allow ten new lung transplant programs to be created each year, if we make a commitment to provide access to rehabilitation for all who have suffered a stroke, what will the impact be on the overall health of the nation? The current structure of our health care system, with no systematic requirement for data to be quickly reported, makes it impossible to know. It is not that we lack the moral gumption to decide whether to help those who need transplants or rehabilitation, we simply do not have the numbers, the data, the analysis that would allow us to say anything constructive in attempting an answer.

The Institute of Medicine of the National Academy of Sciences and the Congressional Office of Technology Assessment have both issued reports (6, 7) noting that less than 10% of all medical interventions have been subjected to any form of clinical trial. How can the American public be asked to spend money, be it retrospectively or prospectively, and feel happy about it if they lack the proof that their money buys results? If we had information on efficacy, we would know both where rationing is and is not necessary and where we are and are not obligated to help those in need. This seems a small price to pay for what is required in order to assure that our policies at the bedside and in the legislature are as ethical as we all agree they ought to be.

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Legislative Issues in Delivering Health Care

JAMES R. TALLON, JR.

After a speech I gave recently, an angry physician stood to raise questions about the impediments he now felt with respect to his medical practice. He reviewed a variety of arguments, essentially asking, "How can Medicare do this to me?" My answer to him was, "When you dance with a gorilla, sometimes you don't lead." That answer may very well distinguish the elegance of the philosopher's presentation from the less elegant presentation of the practicing politician. I have served in the New York Assembly for 13 years. I have chaired its Health Committee for the last 9. Therefore, for most of the sins of the system I accept some degree of responsibility. I have reached that stage of maturity in my career when I can repeal my own mistakes.

The Legislature's Major Health Issues

I want to contribute some understanding of my world to this conference, so I will start simply by telling you a bit about what I do. I want to briefly review what I consider to be the major issues that I now have before me as chair of the Committee in the 1987 session of the legislature.

Hospital Reimbursement for Patients Unable to Pay. The first of these questions is to reach a consensus on an extension of the hospital reimbursement system in the State of New York. We run between $9 billion and $10 billion a year through the in-patient side of hospital operations throughout this state. And New York State has a long tradition of direct involvement in setting those reimbursement rates. We have on occasion had responsibility under waivers for Medicare's portion of rate setting, although we don't happen to have that right now. In the context of this decision, setting the rules for the reimbursement of the non-Medicare portion, between $5 billion and $6 billion in the upcoming years, we're facing some of the same questions that Medicare faced also. Should we move the base of reimbursement to a case-payment or DRG-based system? Should we establish a more standardized price for the costs of individual DRGs, or should we be guided, as we have in the past, by individual hospital cost considerations?

Should we—and how can we—maintain the unique aspects of this state's reimbursement system, in which, through surcharges and taxes on hospital revenue, we set aside some $500 million a year for a targeted subsidy to those hospitals treating large numbers of patients who have no method of payment? Would we do better to move from a specific hospital subsidy strategy, which is what we have done now for six or seven years in New York, to an expansion of publicly supported programs that would provide greater access to insurance for those people who are "the uncovered"? This might be accomplished by creating new public programs or by further strengthening, perhaps through incentives or perhaps through mandates, the current system in which much of health insurance is linked to employer participation and is employment based. That is issue number one.

Issue number two deals largely with the question of access to care for those who are poor, a question that has several aspects.

Eligibility for Medicaid. The first concerns eligibility for this state's Medicaid program. Editorials have proclaimed how "generous" this is. But eligibility is clearly not generous with respect to large families. In 1987, the federal pov-

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The author was chairman of the New York State Assembly Health Committee when he gave this speech. He is now majority leader of the Assembly. Address reprint requests to him at Room 926, Legislative Office Bldg, Albany, NY 12248.

erty standard for a household of six people was $14,500. In this "generous" state in 1987, a six-person household could earn no more than $7,800 to be eligible for Medicaid. Should our program be expanded?

Prenatal and Postpartum Care. Second, we have enormous concerns over maternal prenatal care and delivery and postpartum infant care. Sections of this state and sections of New York City experience infant mortality rates that rival those of Third World nations. How should we develop and access a system that promises to improve prenatal and infant care?

Financing Long-Term Care. Third is the financing of long-term care of chronic illness. The federal government has now taken a step in the direction of catastrophic insurance within Medicare. But will either the Secretary of Health, the White House, or the mainstream of the Congress take on questions of long-term care financing under Medicare? One of the practical questions we face is how to deal with a state Medicaid program which now allocates 70% of its dollars to those people who are physically or mentally disabled or who are chronically ill. Our program was originally designed to care for poor people but over the years it has evolved into a chronic illness program for people who are poor and for people who were middle class but who have become poor as a result of their long-term chronic illness needs. How should we build on that system in the future? Should we, for example, endorse a system of private long-term care insurance? This looks like an interesting new way of bringing some of the purchasing power of senior citizens to the support of a public system. We recognize that the elderly are not poor in totality, and have considerable purchasing power.

On the other hand, one has to consider that a traditional third-party insurance system would presumably have the effect, as it has on the hospital side after all these years, of increasing demand for services. Furthermore, insurance systems today remain biased toward institutional, as opposed to noninstitutional, services, as was hospital insurance when we entered our current reform mode about ten or fifteen years ago. With respect to long-term care, are we about to again commit ourselves to the same kind of financing mistakes?

AIDS. The fourth major issue deals with acquired immune deficiency syndrome. Based on hearings in New York City over the last couple of weeks and discussions in Atlanta last week, I believe that we have achieved a remarkably broad-based consensus that we should proceed with heavy attention to voluntary testing and strong protections of confidentiality. How does one now proceed in this state to marshall the forces to implement such a strategy? How do we organize the health care system to deal with those predictably large numbers of cases that will emerge over the next five and ten years?

Legislation on Do-Not-Resuscitate Orders. Fifth, can we adopt a statutory set of criteria with respect to the issuance of do-not-resuscitate orders? This is something that has eluded us so far in the State of New York. And perhaps statutory criteria for do-not-resuscitate orders could be a step along the way to further statutory recognition of or legislation on the withholding or the withdrawal of treatment.

I have gone through this list of the most pressing issues before the New York State Assembly Health Committee to share with you my world. Each is an issue I have before me for resolution within the next 120 days. That is the time frame within which the legislature acts. In each of these issues cost containment is simply not an explicit question. In none am I simply asking how I can develop a cost-containment strategy with respect to these questions. Rather, cost containment and the strain on our resources is a background issue with respect to each.

A Racially Divided Society and Health Care

Daniels poses in his *Just Health Care* a question that others have asked; he asks it particularly well. Is health care to evolve as a commodity, or is health care in some way a special social good? I'd pose it a bit differently. I am going to assume that most of my colleagues, if asked the question "Is health care special?" would respond in the affirmative. Further, I am also going to assume that most of my constituents—most of whom are alleged to be conservative—would also respond that they believe health care to be special. Somehow, that commonality of being threatened by illness reduces us all to willingness to accept a common bond of community, in a way we do not with respect to other goods and services in this society. We all seem to accept health care as special. This gives us the opportunity to use health care policy to address some broader issues in society.

Certainly no question has greater political urgency than the emergence of both the reality, and the perception, of racial differences with respect to access to a desirable quality of life in this society and in this city. That is on our front pages right now, and it is likely to appear on our front pages more and more often. Again, after twenty years we have the sense that some of the 1968 observations of the Kerner Commission about two Americas still exist—in New York City pronouncedly and—in a somewhat different context—in the reality of differences of treatment for the Spanish-speaking population in some Southwestern communities.

We have an enormous public policy problem related to distinctions between a white society and the minority society in this city. Is that problem of a divided society related, in any sense, to the health question? Simply going down my list of state health issues shows that the two are related:

- People unable to pay for primary and acute care: clearly people of color are far more likely to be in this group.
- Prenatal and infant care: those communities that have Third World infant mortality statistics are the minority communities of this city. They represent a shocking departure from our perceived standard of living.
- Long-term care: the racial distinction is probably less blatant; however, the current investment in services for the elderly and the underinvestment in services for children has a distinct racial component.
- Confronting AIDS: We have shifted our focus from the gay community to the community of intravenous drug-abusers, a community which is largely composed of minorities. The children of these drug-abusers and those they and their sex and needle partners infect will be the next large group to confront the AIDS avalanche. AIDS programs therefore are linked to the social issues of a divided society.

Budget Crisis as an Opportunity. All these health issues present opportunities to address the fundamental question of social justice. Our failure has been, as I think Daniels is also saying, a failure to respond to this broad question and to focus specifically on the urgency of the racial features of social justice.

Cost containment presents a unique opportunity to take bold positive steps. It is often in times of budgetary crisis that we allow ourselves to raise important issues and to bring together the critical political forces that allow us to confront fundamental questions about how we want to structure the financing and delivery of services. In this state, a major period of policy change developed out of the city and state budget crisis during 1975 and 1976. For better or worse, questions are being raised in Washington concerning how to modify the health care system because the Congress perceives itself as in a budgetary crisis. The pressures of cost provide those of us in politics with the opportunity to focus on the political question of how we want to both pay for and distribute health care. I believe that our economic pressures offer an opportunity to respond not only to these issues of health care services, but also to say and do something important with respect to a broader set of concerns: the treatment and opportunities afforded to minorities within this society. In the immediate future, these will be the toughest questions this state will have to face.

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Ethics and Economics: Implications for Primary Care Training

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Ethics and economics are two disciplines fundamentally concerned with choice. Ethics is the application of moral rules to specific choices. Economics is the study of choice-making for the achievement of alternative goals in situations of limited resources. By integrating the two disciplines, one can examine normative principles for making choices within a context that explicitly recognizes that these choices are made in a context of scarcity (1).

In order to weigh the pros and cons of economic decisions within the medical market, the basic concepts of opportunity cost and economic efficiency should be considered. Opportunity cost is the idea that the true cost of an activity is the value of the alternative endeavors that might have been undertaken with the same resources. Economic efficiency is the idea that a chosen health benefit should be achieved using the least costly combination of inputs (2). Allocation reflecting these two concepts aims at maximizing the benefits to society from the resources available.

The Market. If we are to live up to the standards set for us by medical ethics while continuing to maintain a mixed-market approach to the distribution of health care in this country, the role of the market in ethical choice-making must be made explicit. A market is a structural environment that arises when resources are scarce (3). Here the market is defined by a set of exchange relationships between independent transactors, the producers or suppliers of a particular set of commodities, and the buyers or consumers in the medical market. Although alternative models of the health care market have been proposed (4–7), the one most favored by policymakers recently for its efficiency has been the competitive model.

Tension in the Market. The current competitive market-driven revolution in the American health care sector has been divisive: it has pitted health care providers and policymakers against one another. Providers complain that policymakers seek to cut costs without any regard for quality. Policymakers complain that providers' manifest concern for quality is a smokescreen defending provider incomes. This dispute seems to be an unavoidable consequence of American health care policy which had attempted to avoid rationing while distributing health care fairly and efficiently through a publicly subsidized market system.

Attempts to contain costs in a market-driven economy tend to discriminate against those with no power in the market. Rationing is happening now, and the rationing is ethically unacceptable. Disturbing findings of the 1986 National Access Survey show a deterioration in access to medical care among the nation's poor, minority, and uninsured citizens (8). More specifically, in 1986 an estimated one million people tried to obtain care but could not afford it, over 38 million pregnant women did not receive health care during the first trimester of pregnancy, and parents of over 18 million children were uncertain about whether their children's immunizations were up-to-date.

Efficiency. The particular services provided in a health care strategy could be produced more or less efficiently. For example, a patient's blood pressure could be measured by a physician, a

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nurse, or a technically trained nonprofessional, with large differences in cost. Such efficiency is called economic efficiency. Technical efficiency, on the other hand, consists in selecting strategies that avoid harmful or useless care so that a particular sum of money could bring about the greatest possible improvement in health. By improving technical efficiency, economic efficiency, or both, we can either improve the quality of care without increasing its costs, or reduce cost without damage to quality.

The Economic Model for Health Care. Since, in America, we operate in a market environment, using prices and costs as rationing devices for our medical resources, it is fair to carefully consider cost in the assessment of quality of health care. To illustrate: imagine a patient who bears the full cost of treatment, so that increases in medical cost are consequences that the patient wishes to avoid. Although there may be elements in a strategy of care that increase the expectation of health benefit, the cost may be too large when compared with the benefit; in other words, the opportunity cost of the proposed medical treatment is too high. The patient and the practitioner are then justified in excluding those expensive components of care which promise little benefit. It follows that the optimal quality of care for a given patient may fall short of attaining the full benefit that current medical science is capable of conferring.

In allocating and distributing health care, the question then becomes: are we using all resources in the best possible manner to achieve the greatest amount of health for the dollar?

If the socially optimal strategies of care were known, these could be taught, so that good care for individual patients would be identical in the physician's mind with socially optimal care. Although principles of technical and economic efficiency in clinical practice can contribute to medical excellence (9), there is a danger here. The acceptance of social priorities means, at the extreme, classifying and treating individuals according to the amount of expected health benefit (10).

Promoting Socially Optimal Care. It is not just a question of danger, but also a question of effectiveness. Unfortunately, the socially optimal model of health care distribution is not being promulgated. In a recent conference of leading medical educators (11), it was concluded that medical education does not drive what physicians will do in the market, but rather that education is a reflection of the market in which medicine is practiced. Short-run undergraduate programs in empathy training or cost-effective test ordering have been resounding failures in achieving behavioral change over the long run as students enter a highly specialized, technology-driven medical care environment that tends not to support these new attitudes and skills.

What can be done to institutionalize a more socially optimal model that meets both economic and ethical standards? One recommendation is to increase the proportion of primary-care physicians relative to the number of specialty physicians. Currently, much general care is provided by subspecialists (for example, cardiologists giving stress tests). As the income differential between subspecialists and generalists continues to increase, this practice tends to further drive up costs.

Training more primary care physicians, as the New York State Commission on Graduate Medical Education recommends, could reduce the opportunity costs associated with highly technical, expensive health care typically offered by specialists. In order to encourage medical students to become primary-care physicians, economic incentives need to be adjusted, perhaps through at least partial loan interest rate forgiveness for medical students who choose residencies in primary-care specialties.

Both ethical and economic standards can be achieved by such explicit policies designed to increase the number of primary-care physicians. Through increasing the number of primary-care physicians, we can increase access to appropriate health care while limiting government intervention in the day-to-day medical decision-making process in the name of cost containment. This proposal would conform with economic principles of efficiency without infringing on moral dimensions of the doctor-patient relationship. Indeed, it has the potential for enhancing quality, by encouraging greater continuity of care which is typically provided by primary-care physicians.

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Criteria for Transplantation: A Physician's Perspective

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As Director of the Renal Transplant Service at the Mount Sinai School of Medicine, I discuss here some of the significant ethical issues relating to transplant patients throughout the United States, sharing some of my personal views and those of my compatriots.

New York City: Problems of Local Loyalties and Institutional Relations. Some problems of organ transplants are unique to New York City. This city has many medical schools and each wants to be in the transplant business. Until recently, each acted independently to procure organs. Without centralization, procurement and distribution was not equitable. However, in 1986 the Regional Organ Transplant Program was instituted. Their role is to survey and secure all available organs in the region.

The various hospitals in the greater New York area have relationships with the various transplant programs. Mount Sinai, for instance, which has a transplant unit, has a relationship with about five potential donor hospitals. When an organ is procured at any one of these, a transplant team from Mount Sinai goes to the institution to obtain the organ. If a pair of kidneys is obtained, Mount Sinai has first option on one of them; the second kidney joins a pool from which organs are distributed to all other transplant programs in the New York region, by a point system which reflects how many kidneys the hospital has contributed and how many it has used. Kidneys from other cities are also distributed by a point system.

This is a reasonably fair system, but it does involve certain inequities. Many of us who are actually involved in kidney transplants take the view that all kidneys in the greater New York area should be available to the dialysis community at large and be distributed according to rational criteria evaluating the patients, without regard to any institutional relationships.

There is obviously an increasing demand for organ transplants and a demand for open, public, and fair criteria for recipient selection. This demand stems first from the nature of organ donation, which asks for a voluntary gift by an individual or a family to a stranger, and second from the requirement that this life-saving resource be used in a manner that assures good rates of survival of the graft and the patient and an acceptable length and quality of life. As stewards or trustees of donated organs, procurement agencies should consider these issues and make decisions on allocation based on need, effectiveness, and fairness.

Unfortunately, decision-making is frequently affected by a very strong bias in favor of the community in which the organ is procured. Even when there is a better match or a more needy recipient elsewhere, organs are often given to the patient who is closely connected to the procuring institution. This, in part, derives from the fact that the attending physicians have established relationships with their own patients. When doctors know a patient, and know the patient's problems well, understandably they want to keep the organs they have procured for their own patients. This approach to allocation means that physicians may deny a more appropriate patient outside their community of the chance to receive an available organ. It also highlights the need for rational allocation criteria.

Matching. Justice and medical effectiveness indicate that the patient with a perfect histocom-

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patibility match should always be offered that organ. I think this principle is almost universally accepted by the transplant community. Even though there is some doubt about whether matching is crucially important now that we are in the cyclosporine era, it is still felt that a perfect histocompatibility match mandates that a kidney be sent to the institution in which the matching recipient is being treated. The importance of matching as an allocation criterion suggests that there must be a centralized computerized system which can identify these perfect matches. [This already exists through the United Network for Organ Sharing, UNOS.—Author]

Another dictum of transplant matching is that almost all O blood-type kidneys should be used by O recipients. O recipients can only receive O kidneys, and there is therefore a desperate shortage of O organs. Although kidneys from type O donors can be used in a recipient with any blood type, the preference should always be given to O recipients.

On the other hand, using this criterion, a highly sensitized patient, a patient who has antibodies to virtually all human histocompatibility genes or antigens, would have a very small chance of getting a kidney. On every available kidney, this patient will cross match positive, which means he will quickly destroy the kidney if it is given to him. Nevertheless, virtually everybody, at least in the local community, agrees that a highly sensitized patient should get a negative cross match organ, because it would give him his only chance to receive a transplant. We know that the results in those patients (called "responder population" because they respond significantly to foreign antigens in an immunologic sense), are much worse than the results in patients who do not have antibodies. Young dialysis patients, and patients who have just begun treatment on dialysis, can be expected to do much better than the patient with antibodies. Yet we feel we have an obligation to the patient who has only this last small chance. Although matching is an important criterion for transplant decisions, it does not seem to be an absolute rule.

Urgency. Should the person who will die soonest without a transplant be given priority for receiving an organ? The answer is not as clear-cut as it might seem. For example, patients already in a hospital because of their need for liver transplant, or patients already in coma, hours from death, need an organ desperately. Yet they have an extraordinarily high operative mortality rate, and the success rate is therefore only about half as great as in patients not yet in such desperate need.

To whom should the organ go? If you give it to the patient who needs it the most, you increase the risk of death from the procedure by 50% for another patient waiting at home, approaching that end stage while waiting for an organ. I do not see any clear-cut solution to this problem. Individual judgments will be made by the physicians who are experts in this field and, obviously, urgency of need is not an absolute dictum.

First Come, First Served. It is also generally agreed that when patients are in an equally good condition, justice suggests that length of time on the waiting list is the fairest way to make the selection. The choice between two patients with the same antibody profile, the same disease, and approximately the same age should be made on the basis of first come, first served.

Histocompatibility and Racial Differences. How do you decide who gets the kidney? Even with decision criteria, the question of ranking the criteria remains. Do you decide who will receive the next organ on the basis of matching? Sometimes that criterion is used. In SUNY Stony Brook, Long Island, for instance, matching is the most significant criterion. This makes good immunologic sense. But using matching as the most significant transplant criterion denies organs to a large segment of the population, since blacks, orientals, and hispanics are different from whites in histocompatibility profiles, and although most dialysis patients in urban centers are black, most donors in urban areas are white. Therefore, if tissue typing were used as the primary criterion for decisions on who gets kidneys, we would deny most of our community's black, oriental, and hispanic patients—who are poor matches against most donated kidneys—the right to have a transplant. On the basis of histocompatibility, we would probably end up sending most locally donated kidneys to Iowa or Minnesota. So we don't do that. Again, we are not necessarily choosing a patient who has the best match or the best chance for long-term success. How to rank these criteria in choosing the patient who will receive the next organ is certainly debatable.

Age. What about age? Should there be discrimination against the elderly in the allocation of organs? In our program, 62 is generally the upper limit of age eligibility for receiving a kidney. Should a 62-year-old get an organ, or should a 14- or 13- or 12-year-old child? We tend to discriminate in favor of the child in these circumstances. And it is discrimination. We are biased toward the child on the basis of good medical criteria. We know that a child does not do well on dialysis. We know that a child on dialysis not only has physical growth problems but also severe psychological problems. To have a relatively normal adolescence, the child must get the graft. And we do discriminate against older patients.

These are extremes, however, and, in general, we do not pay much attention to age. We pay attention to the other criteria, and we only discriminate against the older patient in the unusual circumstance in which we have to choose between a child and an older person on the list.

Lifestyle. What about lifestyle? Imagine that we have one kidney and two potential recipients: one a middle-class college professor, and one a drug addict who destroyed his or her own kidneys with heroin. Who should get that kidney? Difference in lifestyle does not count as a criterion for choosing between patients at Mount Sinai. But it does play a role in some units. There are biases. Physicians are middle class, in general, and they may look down on the drug addict as a pariah [see Barry Stimmel article]. As physicians we know lifestyles are not simply chosen, and that the drug addict population in New York largely results from a failure of our social system. Addiction is often, at least in part, a reflection of problems like unemployment, poor schooling, and broken homes. If individual addicts are not entirely to blame for their addiction, why deny them the right to have that kidney?

Lifestyle should play a role in decision making only when it can be expected to jeopardize the success of the procedure. The alcoholic who goes on drinking after a liver transplant and the drug addict who continues to mainline after a kidney transplant would have little chance for long-term success.

Similarly, the patient's social network of support could count as a decision-making factor. A person from a strong middle-class family with a strong familial support system will come regularly to the clinic and for follow-up visits and will take prescribed drugs regularly. Because the family is observing this patient, he will get good nutrition and, if problems arise, will be taken back to the hospital very quickly to ameliorate those problems. So lifestyle does play a role in allocation of organs because the presence or absence of a social support network has medical consequences. The better the social support, the better the chances for success. But this is a relatively minor criterion in our decision-making.

Repeat Transplantation. Earlier I alluded to the question of whether individuals should be allowed a second or third or fourth organ transplant. Medically we know that the person who has had three transplants will probably reject the fourth. Right now, a person getting a first kidney transplant has an 80% to 90% chance for a long-term success. Chances for success diminish to around 20% or 25% for a fourth transplant.

How the Criteria Are Used—Or Not Used. Preferential assignment of an organ to a recipient should be based upon objective medical criteria such as matching (and I have already specified my reservations there), sensitivity, and length of time on the waiting list. These are well accepted and well recognized criteria. Others, such as age, urgency of need, lifestyle, and retransplantation, must be carefully applied to individual cases.

It is estimated that, on the whole, only about 15% to 25% of all kidneys are allocated on the basis of the criteria for mandated organ sharing, either a perfect match or a negative cross-match on a hypersensitized patient. All the rest, the other 75% to 85%, are being distributed according to individual physician judgements.

Technical Considerations. There are some further technical, practical, and ethical limitations that I want to raise. Again, I want to reiterate my belief that donated organs are a national resource. This implies that any citizen of the United States who needs a transplant should be considered as a potential recipient for every graft with a claim equal to that of the recipient who lives in the donor's local community. Nevertheless, practical and technical limitations do exist. The cost and time required for transporting an organ of course have to be taken into consideration.

We know that the longer we preserve an organ, the longer we keep it outside the body on ice or connected to a machine, the greater the likelihood that it will not function very well. Death of cells does occur in some cases. Also, with prolonged ischemia time, 72 h or 96 h, very often there is poor initial functioning. It makes our job much harder to maintain a patient for the first week after transplantation if the organ is not functioning well.

Aliens. One other problem I think should be addressed: the problem of nonresident aliens who come to the United States, specifically for an organ transplant. The question raised by this group is different from the issues raised by aliens coming to this country for other forms of medical treatment, such as radiotherapy, surgery, or cancer treatment. The difference is that widespread access is not possible: there is a definite scarcity of transplantable organs throughout the United States. It is estimated that less than 5% of potential heart transplant recipients get the organ they need. Probably, the same figure applies for liver patients. Probably, less than half of potential kidney transplant recipients get their organ. What should we do about aliens who come to this land of opportunity to get a kidney transplant?

American taxpayers have supported the system of kidney retrieval and distributions; their dollars do it. What should we say to nonresident aliens? Do we say to them, "Well, you can come, but you've got to stay on the bottom of our list. After we take care of all of ours we'll get to you." That seems rather unfair because it is misleading. They will never get organs.

Do we say to them, "Well, we'll set up a quota system. We'll say that maybe no more than 5% or 10% of all the transplants we do in the United States should be given to aliens." That seems to be the system that is evolving. In fact, that was the recommendation of a presidential task force. But everybody realizes that this is a major compromise. We are really discriminating against these patients by allowing them only 5% of U.S. transplants. One of the things we—at least I—believe in as physicians is that medicine should know no national boundaries. These people have as much right to what we have to offer, what I have to offer, as any other person, any American. But realistically it cannot be done that way. We would be flooded, and the American public would not stand for it.

Selling Organs. The problem of the cost of transplants for aliens leads us to the question of commercialization. Should we allow aliens and others to buy their kidneys? The major reason for prohibiting the selling of organs is that the moral values of our society mitigate against regarding the body as a commodity. We claim that we are not supposed to sell our organs. But is that absolutely so? We sell blood. We sell sperm. We sell other things. Perhaps it is not wrong to sell organs if you can avoid making the sale into a bidding war.

We know that the operation for donating a kidney from a living donor is very low-risk surgery and we have been telling living related donors that for 25 years. If we had a person who was in desperate financial need and wanted to sell one kidney, and if we didn't sell the organ to the highest bidder but allowed it to be distributed according to the principles I have laid down, a fair equitable match, for a fixed fee, paid for by a third-party insurance company, or paid for by the federal government or a state government, would that be morally permissible?

I know an Indian doctor who was once a nephrologist at Mount Sinai. He went back to India, and he runs a dialysis program in Bombay. In India, you do not get dialysis unless you are very wealthy; they do not have the national finances to support a national program. He came to me one day and said, "Look, suppose I bring you a large number of very wealthy Indians who will each have in tow a donor selected by me on the basis of HLA typing, general health, and things of that sort. The donor will be an unrelated peasant. The rich patient will pay all of the peasant's medical and other expenses and give him a large stipend for his kidney." Of course I expressed abhorrence at this suggestion. I said, "Well, if you want to do that, take it elsewhere, because we do not buy kidneys here. It's unfair."

His answer to me was, "But you're thinking like an American. Think like I think. Think of what a few thousand dollars could mean to the Indian peasant. It would change his life, and the lives of his children and his children's children, forever. He would be able to buy a piece of land or send his children to university. Otherwise, he would be trapped in his lowly place in society for all future generations. It would be entirely an act of informed consent. He would understand his choice, the risks, and the likely effects."

I am not sure he was so wrong. I do not now think that the particular situation described was so horrendous. But again, in Western society we do not like to think about selling organs. But if you think about it, at least in the context of India, it is not that bad an idea.

Costs. In the United States there are definite laws against the selling of one's organs and very high fines and potential jail time for persons who participate in this activity. But who are we kidding? The ability to pay plays a very important role today in liver and heart transplants. You cannot get a heart transplant unless you have about $95,000 and you cannot get a liver transplant without about $130,000. Unless you have your own personal funds, or the support of a local community that raises the money, or a third-party insurer willing to give you that money, you are denied access to virtually every program in the country.

What's the solution? According to the task force and my own assessment of the problem, the federal and state governments have to get involved. Transplantation is a recognized method for treating patients: it is effective and now works well. The costs are high, but not higher than the costs of taking care of a patient with cancer or AIDS, and the results are much better. Sooner or later the federal government will have to get involved. Because there is an organ shortage, the total costs to government are now predictable and relatively low. When we begin to have an ample supply of organs, the system will have to be reevaluated; the total cost may become prohibitive. Because of the financial burden on individuals, we are presently brokering away livers and hearts. We are not doing so with kidneys because the federal government pays for kidney transplants.

No Absolute Answers. There are really no absolute answers to many of the problems in transplantation today. There are relative answers and different answers in different transplant programs in this city and around the United States. The Task Force did find that, in general, the system which has evolved for kidney allocation and transplantation in the United States is fair and equitable. That is certainly true of those programs which vigilantly and constantly make a sincere effort to be fair and equitable in their treatment of all patients.

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Procurement and Allocation Policies:

Should Receiving Depend on Willingness to Give?

JAMES MUYSKENS, PH.D.

The connection between policies on organ procurement and on allocation ought to be drawn more tightly than it usually is. Typically we adopt one without regard to the other, yet the philosophical framework underlying one ought also to underlie the other. Insofar as current allocation policy has a theoretical foundation, it is a philosophy of the common good, a "communitarian" view that commits us, wherever possible, to make organs available to any member of the society in need of them. Our procurement policy, on the other hand, has its roots in libertarianism, an individualism that rejects the concept of the common good in favor of that of the public interest. Whereas the idea of the common good arises from a vision of society as a community whose members are joined in a shared pursuit of common values and goals and in which each individual's good is inextricably bound up with the good of all, the idea of the public interest arises from a vision of society as an alliance of self-interested individuals who join together in the pursuit of mutual advantage.

In this essay, I pose the following challenge: if we wish to stay with our current libertarian procurement policy, let's adopt a libertarian allocation policy as well. Conversely, if we wish to continue the drift toward a communitarian allocation policy, let's modify our libertarian procurement policy.

Current Procurement Policy: The Individual Libertarian Contract

A brief look at current procurement policy will reveal its libertarian underpinnings. The Uniform Anatomical Gift Act (UAGA), adopted by all 50 states between 1968 and 1973, requires explicit consent of the organ donor. The UAGA's policy of "encouraged voluntarism" (to use Arthur Caplan's apt description) ranks the principle of self-determination or respect for individual autonomy above all other moral principles. One of its key assumptions is that a "donor's" autonomy is duly respected only if an individual contract is negotiated. Any procurement policy that does not rest upon consent via a contract is seen, by proponents of UAGA, as riding rough-shod over individual liberty, the most treasured possession of citizens in a liberal society.

As in the therapeutic context, in which a patient's consent is (correctly) seen as the deciding factor in treatment decisions, so in obtaining cadaver organs for transplantation consent is taken to be the key condition. Of course, obtaining consent from deceased donors is somewhat more complicated than from living patients. The time for obtaining consent is past, once the donor is a cadaver and is in a position to "donate." This leaves us with a front-line strategy and a fall-back position: encourage people to make decisions about these matters when they are still very much alive (for instance, have people sign donor cards); failing that, do what we do in therapeutic contexts with incompetent and comatose patients: ask their families for consent.

The starting point of current procurement policy is the individual and his or her rights to privacy (the right not be interfered with) and property (the body viewed as property of the deceased)—the key principles of libertarianism. Any use of an individual's organs after death without that individual's (or the duly authorized representative's) express permission is seen as trespassing, as infringing on the most basic rights of that individual.

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Is Explicit Donor Consent a Morally Necessary Condition?

Those who argue for fundamental change in our procurement policy must challenge the widely held conviction that explicit consent is a morally necessary condition of procurement policies. They must confront the received wisdom that any alternative policy that does not require explicit consent of the donor must be rejected on ethical grounds. Typically, respect for autonomy in organ procurement policy is identified with explicit consent. Since we can all agree that any procurement policy that rides rough-shod over autonomy must be rejected, the only way an alternative policy that does not require explicit consent can get a hearing is to challenge that identification.

In order to challenge the identity of respect for autonomy and explicit consent, we must consider the appropriateness of modeling organ procurement policy on that of patient's rights. Perhaps the therapeutic model, one in which we (quite rightly) insist upon obtaining (informed) consent before invasive procedures may be initiated, is not the most appropriate to use in devising procurement policy.

"Contract" Autonomy vs. "Citizen" Autonomy. In the clinical setting, speaking simply, we contract for a cure. But suppose that the procedures recommended for the cure require amputating my arm. I may not want that, and I may decide to take my chances without the operation. If I am not informed of my alternatives and allowed to choose, my autonomy has been violated. (I am indebted to my colleague Professor Steven Ross for the ideas in this paragraph and the following four.)

Because people can want things and, with perfect rationality, not want what those things turn out to entail, when we contract to bring about some general end we cannot presume that whatever bringing about the general end requires is also what is wanted. Typically the clinical setting involves such "conceptual underdetermination." By knowing and understanding the general end, we do not necessarily know or understand the various means by which the end can be realized.

A physician who knows that the patient wants to be cured cannot just presume that the patient will want the therapy that is offered as the best means to the end. In contractual contexts such as this involving underdetermination of means, respect for autonomy requires obtaining explicit consent.

Not all relationships, however, are contractual. We live by all manner of restrictions and policies that are not products of one-to-one contracts. Yet we do not feel that our autonomy is being compromised. In a democratic society all manner of social policy is generated by legislatures and adopted through majority vote. Many of these policies deeply and intimately affect individuals—on automobile registration and inspection, speed limits, screening infants for PKU, inoculations as requirements for admission to school, autopsy findings and criminal or insurance investigations, public health measures in an epidemic, the military draft, fair housing legislation, zoning restrictions.

With the exception of the extreme libertarians, we generally agree that such social policies do not infringe on our autonomy as citizens so long as the policies are enacted via the correct procedures for the formulation of social policy and, where necessary and/or possible, have "opt-out" clauses. The provision in selective-service legislation for conscientious objection is an example of an "opt-out" clause.

The question that must be asked is why organ procurement policy must meet the conditions of "contract" autonomy, as opposed to the "citizen" autonomy just described. I've suggested that many of the advocates of current policy simply assume that "contract" conditions must be satisfied, because they have (incorrectly) seen the postmortem removal of an organ as an analogue of therapy. If we free ourselves from that model or metaphor, it is possible to devise a procurement policy that meets the demands of autonomy yet does not rest upon explicit consent. I have argued for such alternatives elsewhere (1, 2). Present aims are much more modest. I'm simply pointing out the possibility that an alternative policy not requiring explicit consent could be morally defensible.

Implications of Nonexplicit Consent. The implications of such a possibility are far-reaching. A policy that does not have to meet the condition of explicit consent by each donor holds the promise of making many more life-saving and life-enhancing organs available for transplantation. Such a policy, in contrast to the UAGA, would not be dependent on the donor card.

Perhaps, as some proponents of current policy maintain, the number of people who sign the cards will increase with greater educational efforts. To meet the current and anticipated need for organs, however, the increase must be significant. The pool of potential donors has to be vast, since only the very rare death provides organs suitable for donation. Experience so far gives little ground for optimism that we will be able to amass the necessary donor pool through donor cards.

States tried to make signing the cards easy by including cards with driver's license applications or inserting check-off boxes on the license itself. Yet even among those most willing to be donors, a disappointingly small number actually sign cards. Also, the persons most likely to sign the cards are frequently the least suitable or least likely donors. Little imagination is required to know how the following questions will be answered in a typical college class (a set of ideal donors): How many of you would be willing to receive a kidney, should you suffer renal failure? (Usually everyone) How many of you would be willing to be a donor should you die in the appropriate way? (Over 70%) How many of you have signed donor cards? (10%)

The attempt to obtain organs for transplantation using a method so solicitous of individual choice is certainly a noble one. Yet the fact that neither now nor in the future can we anticipate an adequate supply of organs, if we remain with the policy, certainly suggests that we should search for some alternative. Those who reject such a search are likely to say that, although the shortage is a tragedy, it is a lesser evil than would result from adoption of alternative policies.

Suppose, however, in opposition to those satisfied with current policy, we can demonstrate that more effective policies (as, for example, some versions of routine salvaging or presumed-consent policies) can give sufficient weight to autonomy or individuals' freedom of choice. Wouldn't it then behoove us to pursue such a policy?

In Practice, Individual Autonomy Gives Way to Family Rights

Reticence to sign is not the only problem with donor cards. Despite the efforts over many years to get people to sign cards and the weight of the law behind them, an unanticipated problem has arisen: transplant teams hesitate to act on the basis of a signed donor card, deferring instead to the families of the deceased. Despite the law's attempt to make the wishes of the deceased controlling, it is the family's that is. Even when a donor card has been signed, it's the family's decision that the transplant surgeons rely upon.

I have argued elsewhere that this may be a good thing (2). But it is not a good thing from the libertarian perspective. A major aim of the Uniform Anatomical Gift Act of 1968 was to resolve conflicts between the wishes of the deceased and of next-of-kin in favor of the deceased. In fact, it stipulates that in case of conflict the expressed wishes of the deceased are to take priority. Recognizing, however, that some suitable donors will not have signed donor cards, it goes on to say that in those cases in which the deceased has not expressed an opinion about disposition of his or her body or body parts, the next-of-kin may make the decision.

Despite gallant efforts to circumvent the family, the family remains at the heart of the matter. Typically the family is consulted even if a donor card has been signed; and, if they object to the donation, it's not likely the organs will be removed. On the other hand, if there is no signed donor's card, as we saw, the bill stipulates that the next-of-kin are to make the decision. Either way, the family is in the controlling position. It is they who, in their most intense moment of grief, are asked to grant permission to have their loved one's organs removed to possibly benefit someone else. If agreement can be obtained, they are given a form to sign. Their signing initiates the procedure.

The Evolution of a New Nonlibertarian Policy

Understandably, many health professionals have hesitated to jump in and confront a bereaved family with such an emotionally wrenching decision, a decision that, at that moment, may appear to the family as a betrayal and seem hasty and intrusive. The requester is quite likely to be rebuffed as cold and insensitive, as failing to empathize with the family in their moment of loss. The health professional may feel that the family is in no position to make such a decision, that what they especially need at this time is support, ritual, routine, the backing of the community, and that they now need others who care about them to step in and act on their behalf, to see to it that their deeply held values and interests are upheld in their time of crisis.

"Required Request": Halfway to Communitarian Policy. The problem of health professionals' reticence to ask families to consent to have their loved one's organs removed for transplantation has been addressed recently by half a dozen states, including New York, by the introduction of a new law called "required request." It requires that physicians talk to families of individuals who have died and are suitable donors.

Although, in my judgment, required request is a halfway measure, it is a step in the right direction. It recognizes the community interest and rights in the matter of organ procurement. The requirement makes health professionals representatives of the community, speaking at the behest of the community. In effect, it is saying that we as a society have made a commitment to provide life-saving and life-enhancing organs to citizens in need. Because this is a serious commitment of the vast majority, we are not going to let people evade the question of participation when someone has died and a suitable organ is available.

I call this a halfway measure because it is less than satisfactory from both the libertarian and the communitarian perspectives. The libertarian has to be concerned about how far we have moved from the starting point of explicit consent of the donor. The communitarian has to be concerned that the policy has not gone far enough in making explicit the nature of the authority by which the health professional is coming to the bereaved family.

A required-request policy remains within the "contract autonomy" model, in that it is asking for consent. Yet its philosophical framework is communitarian as opposed to libertarian. Whereas before the required-request law, the physician asking a family to donate was simply appealing to them as individuals who may be interested in helping another or in advancing the business of transplantation, with the new law the physician is acting on the authority of the state and as a representative of the state.

Asking for Consent vs Allowing Objections. If the state has the right to mandate confronting every bereaved family with the question of donation whenever the deceased happens to be a suitable donor, why not go an additional step? Instead of requiring physicians to try to obtain consent from the family, they would be asked to inform the family that we, as a people, have a policy of salvaging life-giving and life-enhancing organs. In accordance with this social policy, we will remove certain organs from the deceased unless they have objections or there is reason to believe that the deceased would have objected given the opportunity.

The importance of the seemingly subtle difference between asking the family for consent and giving them the opportunity to object to a democratically established practice can best be seen by putting ourselves into the place of a grieving family.

Scenario 1: Our 21-year-old son has been killed in an automobile accident. We have been notified of the accident and have rushed to his bedside. He is declared dead. We are in shock and disbelief. At this moment we are asked to decide whether we will allow a transplant surgeon to cut him up and remove some of his vital organs. We react in horror and despair.

Scenario 2: The same, except that we are not asked to shoulder the burden of a decision to remove the organs for transplantation. Instead we are told: "As you probably know, it is official practice here, and everywhere else in our state, for suitable organs to be routinely removed from patients with brain death. Unless you and the rest of your family object, we will surgically remove one or more of your relative's vital organs in order that some other needy patient might live. In case you do object, we will certainly respect your wishes." We say that we have no objections.

Is it plausible to think that these two scenarios would go this way? Would the second more likely result in organs for transplantation than the first? The reason I am convinced that it would is that, at these moments of intense crisis and feeling of loss, aloneness, and abandonment, it is extremely difficult to take upon oneself yet another decision. To make this particular decision at this time conjures up images too horrible to contemplate. On the other hand, to be informed that it is routine procedure to make organs available for others, and that this will be done barring an objection, does not demand the same shouldering of responsibility at the very moment that it is nearly impossible to do.

Ending the Isolation of Procurement and Allocation Policies

I have tried to show that explicit consent procurement policies are not the only ones that are morally acceptable. A suggested alternative requires instead that the democratically adopted policy of routinely removing suitable cadaver organs include an opportunity for a donor or his or her family to "opt out." Whereas the first policy satisfies "contract autonomy," the second satisfies "citizen autonomy." How do these two procurement policies fit with allocation policy?

Current explicit-consent procurement policy, combined with an open-ended or general-invitation allocation policy, has resulted in demand far outstripping supply. Persons who never would have considered being donors bitterly complain when in need and no organ is available for them or their loved ones. We have come to this untenable position by divorcing responsibility from rights. But can we grant such rights without also ascribing the correlative responsibility? If you feel that you have a right to an organ should you need one, don't you have a duty to be prepared to donate yours should you no longer be in need of it while another is?

Procurement policy should not be viewed in isolation from allocation policy. Currently we have explicit-consent procurement and presumed-consent allocation. We have tended to assume that moral considerations dictate this combination. We presume that everyone is in on the receiving end; why not then on the giving end?

I've presented a few arguments designed to show that at least a weak version of a presumed-consent procurement policy need not be rejected on moral grounds. If these arguments are persuasive, then we have another alternative open to us, namely, the combination of a presumed-consent procurement policy with a presumed-consent allocation policy. Everyone is in on both the giving and receiving end, unless they choose to opt out. Opting out, they must understand, consists not just of saying "I object to giving," but also of saying "I do not wish to receive."

On the other hand, if we wish to continue explicit-consent procurement (either for moral or other reasons), we should also adopt an explicit-consent allocation policy. Only those who "opt in" are in on either the giving or receiving end; there would be no presumed entitlement to organs. Each individual would be required to choose whether he or she wished to opt for protection against organ failure. If so, the "premium" to be exacted would include signing a donor card.

It may be that we'd never let someone die simply because they didn't opt for the insurance. That would be both a noble sentiment and an admirable policy. Yet if a shortage continues and if priority is given to those who opted in (as fairness would require), then those who opted out may end up being too far down the list to get an organ.

We could allow insurers who offer coverage for transplants to include a clause that their obligation to pay is contingent on the claimant having signed a donor card. Such a strategy would be quite consistent with the libertarian foundations of the UAGA. It also would procure quite a few more organs for transplantation than current strategies.

What alternative do I prefer? I prefer the weak presumed-consent procurement policy outlined above, combined with an allocation policy that is premised on the principle of entitlement based on need. Such a combination of procurement and allocation policy not only is based on a consistent communitarian commitment; it offers as well the greatest promise of being humane, effective, and unobtrusive. On the other hand, if the commitment to an explicit-consent procurement policy is unshakable, let's adopt an allocation policy that explicitly favors those who have "opted in."

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The Report of the U.S. Task Force on Organ Transplantation: Criticisms and Alternatives

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Abstract

This article discusses the recommendations for the acquisition and distribution of organs in the Report of the U.S. Task Force on Organ Transplantation. It first considers several possible means of acquiring organs and offers a conception of the relations which a person, his or her family, and the state have to the bodily remains. The article then examines the idea of need for organs and considers certain principles for weighing outcome and need in distribution decisions. It also criticizes the report's recommendations for the distribution of blood type O material, offers a proposal for line-jumping, and criticizes the report's arguments for federal subsidy of organ transplantation.

In this discussion I focus primarily on certain proposals made in the Report of the U.S. Task Force on Organ Transplantation (henceforth referred to as Report) for the distribution of organs (1). In connection with this topic, I shall also discuss the acquisition of organs. I shall first briefly summarize some of the Task Force's major proposals on acquisition and distribution and then present some criticisms. These range from showing that the recommendations involve outright inconsistencies and inadequate arguments, to more general ruminations on the foundational ideas of the Report. In many instances, I shall be raising issues and pointing to relevant factors without offering any final solutions. This may irritate the action-oriented medical professional; however, not every word on a subject needs to be the last word. The primary aim of this article is to examine a valuable report that is central to the shaping of medical policy and highlight some of its limitations.

Basic Views of the Report on Acquisition and Distribution

Acquisition

A proclaimed aim of the Report is to describe a fair distribution of scarce organs, given that the organs are voluntary gifts by donors who are not paid, and that (according to the Report) this makes the organs a national resource. However, it is often not the person whose organs they are (call him *original organ owner*) whose decision, in fact, determines donation; that decision to give, which could be acted on legally, can in effect be overridden after his death by the family's desire not to give, and if the original owner has made no decision, the family may make the decision to give. The Report (2) suggests that families, not original organ owners, are the crucial factor in acquiring organs, and the Report raises no moral objections to that state of affairs. In particular, although the Report comes out against presumed consent to donate and states that "present efforts should focus on enhancing the current voluntary system rather than on reducing the role of actual consent," the actual consent it is concerned with is not that of the original owner but that of next of kin (p. 31).

The Report notes that physicians are reluctant to act on donor cards without the consent of next of kin (p. 29), and it specifically places no

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emphasis on increasing the number of those who fill out donor cards or on registries of willing (original owner) organ donors. The Report concludes, "as the organ procurement system now operates the primary focus is on securing permission from the family member rather than from the actual donor [3]. There are good reasons to think that this will continue, and that the system can be made more effective without introducing a national registry" (p. 51). One reason why the Report recommends giving next of kin control is that it is a comfort to the family to give a dead relative's organ, and physicians who know this will find it easier to offer the kin the opportunity to give.

Distribution

The Report considers degree of need and of success in outcome the primary considerations in deciding who shall get an organ in conditions of scarcity. The Report's notion of need, roughly equivalent to urgency, is how soon someone would die, or how badly that person's life would go in the future, without the organ. Successful outcome is a function of the additional length and quality of life that someone will have as a result of the transplant, compared to what he would have had without it. (The Report does not consider possible conflicts between additional length and quality of life, but clearly the good to the patient, not the good to society, of additional time alive is at issue.) Successful outcome is predicted by such factors as (a) how perfect tissue matches are, (b) age of recipient, since the old are less likely to live as many additional years as the young, and (c) other illnesses. There is much emphasis on the view that perfectly tissue-matched recipients should be offered organs first, both to maximize outcome and to prevent sensitization of patients with imperfect matches. Success is also a function of patient compliance with the requirements of treatment and of a support network to care for the patient. The Committee suggests the desirability of using social services for support to compensate for absence of a family in preference to excluding potential recipients on this ground.

Given equal need and expected outcome, those who are first on a waiting list get an organ first. Line-jumping may occur for three reasons:

Individuals who develop the greatest need—usually likelihood of death—move up, or move from outside the line to its head (4).

Already sensitized individuals with the same expected outcome as nonsensitized patients, as predicted by tissue matches, are offered an organ first.

Blood type O material is either (a) offered first to O people otherwise similar in need and expected outcome to blood type A people; or (b) offered only to O people. (The Report recommends both policies, a clear error because the two are inconsistent with each other and both are inconsistent with other recommendations.)

All three reasons can be seen as amplifications of the "need" criterion, since they represent, in descending order, increased likelihood of someone's dying before receiving an organ. This is because of the greater difficulty, in decreasing order, of the sensitized getting an organ, and of O versus A people getting a suitable organ if O organs were given routinely to A people as well. (Blood type As can use both A and O organs, but Os can use only O organs.)

I deal below with the Report's discussion of financing organ transplants, and note here only that it excludes ability to pay as a ground for distributing organs.

Questions about the Report

Acquisition

If the only (or primary) means of acquiring organs is through donation, one might think distribution of the gift should be solely up to the donors. This is the model used when donors who will continue to live give up their organs for others selected by them. This implies, contrary to the Report, that if the organs were taken seriously as gifts, we would not treat the organs acquired after the donor's death as a national public resource, but rather as private gifts to be distributed in accord with private preferences, unless they were donated with no designated donee. In fact, the Uniform Anatomical Gift Act allows the donor to specify a donee (5).

The government might be worried that private designation would not lead to distribution by greatest need and best outcome, and would allow gender and race discrimination (6), although designating a particular donee is not the same as designating on the basis of a suspect category like race (7). In any case, it should not be thought that distribution on the basis of "fair criteria," follows simply from the fact that the organs are gifts. (Furthermore, the fact that donors do not receive money for organs—in fact donors are prohibited from doing so—may suggest that distributors of organs should not reap a profit denied to the original organ owners, but not that recipients, even those selected by "fair criteria," should never pay for organs, the money going for a worthy cause. I return below to the issue of distribution by ability to pay and its connection with means of acquisition.)

Several other general remarks on the means of acquiring organs: first, why should a family be allowed to override the original owner's (legal) decision to give? (The family does not have the right to override the original owner's express refusal to give.) It might be argued that the family members are alive and will suffer if we do not abide by their wishes, whereas dead persons can no longer be harmed if we do not do what they wanted. But we can harm the dead (8), by defaming their reputations after their deaths, or by destroying the projects they completed in their lifetime. If we do not satisfy a person's desires that certain things come about, perhaps we only fail to help, rather than actively harm the person —but that is still something. The dead person's desire was not necessarily only to know or feel their desires were satisfied, but rather that those desires be satisfied. Therefore we can still satisfy the desire, even if, once dead, the person receives no felt satisfaction.

Furthermore, if he or she not only desired that his organs be transplanted, but had a legal and moral right (a right independent of legal recognition) to control the fate of his body and a right that others not control it against his wishes, we would wrong him by violating his rights to control his body if we recognize a right in someone else to override his wishes. Surely a family does not have a moral right to control his body simply because their feelings will be hurt if his organs are taken.

However, if we simply refuse to carry out his wishes because the cost to us is too great (alienating the public from organ transplantation by acting against families), but not because we accord others a right to override his decision, we do not wrong him. After all, he may have no right that we obey his wishes at large cost to ourselves. We may refuse to carry out his wishes because we desire not to hurt the family's feelings, without thereby recognizing a family's right to override his wishes. But should we ignore the original owner's request of us, when acting on it will save a life, simply in order to respect familial feelings, if the family does not have a moral right to override the dead person's choice, especially if we could stem public alienation by explaining that the family best shows respect for the dead by following his wishes?

How the family acquires a moral and legal right to decide to give a dead relative's organs where the relative has made no decision on organ donation also raises some questions. The family's right may arise because their decision is an instance of "substituted judgment," that is, they may be deciding as they think the dead person would have decided. In most other situations of substituted judgment, the family acquires a right because its members are thought to know best what their relative wanted, though she or he did not make a public commitment. Or an organ owner may fear that a public commitment to give his organs will lead doctors not to treat his illness aggressively, and he may therefore express his desire to his family in private. The family then becomes a conduit for the dead person's views. (If a patient's instructions could be read from a sealed document opened only after his death, this need for the family could be avoided.)

In many situations not involving organ transplants the family is allowed to decide, even if it is not claiming to know the person's desires, on the ground that it will decide in the best interests of its family member. In the case of organs, however, the family seems to be deciding a question not about the best interest of the deceased family member, but about using his organs for someone else's best interests. (There may be a very stretched sense in which they are acting for his best interests: Suppose that a life in which a person has helped others is morally better, and that one can make someone's life better by having that person play even a nonactive and unchosen role in a project that contributes to greater good. Then something comparable could be said about the dead, even though literally we would not have made a "life" better.)

Finally, the family may be thought to have a moral and a legal right to decide because, next to the original owner, they care most about the organs in question, or simply because ownership of the body passes to them. Only ownership could yield a moral and legal right; neither caring nor the fact that they will be comforted by giving an organ would seem to be a strong enough base for a moral and legal right. But should a family, independent of the original owner's willing it, acquire all the original owner's powers of ownership of a body, as they do over unwilled furniture? The alternative would be a right to dispose of the body according to the original owner's wishes, as best these wishes can be determined. Although one's own body may be appropriately thought of as one's property, conferring a great deal of control over disposition, it is harder to think of the body as property-like if it passes (unwilled by its original owner) to relatives (9).

The modern struggle has, in part, been to recognize that a person, and not only the family, should have legal rights to arrange for the disposition of the person's remains after death. But there have been recent attempts to argue that neither a person nor the family should have property-like rights in the remains, which are, rather, community property to be used for the community's benefit (10).

The view I propose is that a person has property-like moral rights in his body and on this basis can have a legal right to decide about his remains. He can pass on or deny these rights to others by will, but the rights do not pass by intestate succession—without being willed and in the absence of active denial—to the family. (In law, powers of appointment can be willed but not pass intestate.) Ideally, if a right to dispose of the organs is not willed, the use of the bodily organs would come to an end with the original owner's death. (On this ideal and the state's right to override it, see below.)

Alternatives. What are some alternatives to the present means of acquiring organs? Organs might be sold, if this would increase the number given or distribute those given more in accord with need and outcome. That is, donors might be paid, and so become sellers. This need not imply that recipients would pay (the government might, for example). The poor would be more likely to sell than the rich, and less likely to be able to pay for organs if government did not subsidize purchases. Paternalistic fears that the poor would be imprudent and endanger their health by selling organs for money might be dealt with by allowing only the dying to sell organs, and at a price high enough to encourage a sale but not enough to encourage a poor person to induce an immediately life-threatening condition for a sale. Quality control could be introduced to deal with the (supposed) effect of a market mechanism—that poorer quality is elicited than through altruism.

Is there something morally wrong with selling one's parts? On some views the person is a nonphysical entity (a soul) in a very intimate relation to a body. On other views the person is the body, or perhaps a part of it, the brain. (No one takes the view that a person is the dead body.) The idea that persons may not sell themselves is given one defense in Kantian ethics: Things that have value because they are valued by rational beings have a price, but rational beings have worth in themselves, independent of whether anyone values them, so they have no price, but rather dignity. But why should this affect the permissibility of arranging for the sale after one's death of a nondead body part, which by itself will not be oneself?

It is sometimes thought that one should not commodify anything to which one is intimately related and should only give such a thing as a gift. But should not the prohibition on selling a body part be related to how involved one's personality is with that part? One's personality is less involved with one's kidney than with one's sexuality. The "stupid" question, "What is your favorite internal organ?" makes this point nicely (11). Therefore, sale of a kidney (even during one's lifetime) might be permissible, even if prostitution is not.

Another way of acquiring organs from nondying donors which could be prudent would involve organ trading. People might give organs not necessary for their good health, in exchange for the assurance that if they were to need an organ in the future, they would have a better chance of acquiring one. The dying might also use organ trading, giving their organ in order to improve the chances that a loved one would get a needed organ. Someone who has already received an organ might be required to give one at death.

One organ distribution system incorporating aspects of such insurance schemes, but retaining noninsurance altruism, would treat individuals who could not (for medical reasons) spare organs on a par with individuals who had donated, while treating individuals who could (medically) have donated but didn't less favorably on a waiting list. Like the distinction between rejecting people as friends because they have no money to spend on you (wrong), and rejecting people as friends because, though they have much money, they will not spend some on you (permissible), it is the distinction between the inability and the unwillingness to trade or share that is crucial in this scheme. Those who trade may do so for insurance reasons, but altruism has a role in helping those who cannot reasonably buy insurance, and willful free-riding is eliminated.

A system in which all donations were more clearly altruistic (not paid for, not part of an insurance scheme), might also involve a clause giving lower priority to those medically capable of donating but not acting altruistically, without becoming a nonaltruistic insurance system. Mutual altruism is expected in friendship, and we may break off friendships with people who are not reciprocally altruistic in the relation; yet friendship is not an insurance system if we give when we know we will not need in return, and do not exclude as friends people who lack resources with which to be altruists (12). (Presumably, reciprocally altruistic donors would be even more willing than self-insurers to provide organs for those truly unable to donate. The likelihood, of course, is that any system that both contains an altruistic element and punishes attempted free-riding will induce potential free riders to adopt an insurance motive for joining the scheme, as a way of not losing out on organs.)

Another alternative policy of acquiring organs is simply taking them after death. (Taking is not a policy of presumed consent, since it presumes nothing about the intentions of the original owner.) Consider an analogy: If five people are adrift in the sea after a shipwreck and one of them dies of unavoidable natural causes, are the other four justified (not merely excused) if they save their lives by cannibalizing the organs of the dead person, when the deceased or family's wishes are not known? If they are too weak to cannibalize, may a third party who is in no need help them do so? What if they or the third party know that the decedent or the family would be opposed to it? If all agents are justified in taking in all these circumstances, this supports the view that third parties may in general take organs no longer being used for the sake of others who would otherwise die. (To those who would classify the postshipwreck case, but not the general need for organs, as an emergency, it is useful to remember that lives are lost when transplantable organs are not available.)

What reasons can be given to support such taking? If the original owner or family had a duty to give, this would help us argue for taking from recalcitrants (though it would not be conclusive support for taking, because someone may have a duty which others must not enforce.) Some of the reasons for thinking we have a duty to give organs we are not using are also reasons for taking even if we have no duty to give and, in fact, object to giving. Essentially these reasons involve the (supposed) insignificance of the harm to us in our organ remains being used and the significance of the good done with them (13).

If I take organs for transplantation from someone who is dead and who wanted his organs buried, I do not injure (cause bodily damage to) the person or violate his liberty. (We damage his remains, but they would have rotted anyway.) However, I do violate his property right and also fail to respect his previous wishes. In these ways we can wrong the dead. However, it has been argued (14) that, even when we deal with the living, a property right may be permissibly infringed to save a life. (If we do so, we may still agree that we have not respected his property right in the course of doing the overall right act and may therefore think he has a right to compensation, if compensation is possible. However, this does not mean that if we cannot compensate him—because, for example, it is physically impossible to do so—we may not act.) If it is permissible to infringe a property right of the living when there is no bodily damage to the person and no liberty interfered with, even when we cannot compensate, why may we not infringe the property rights of the dead, even if this infringement is a wrong to them, when there is no bodily damage to the person—only to the remains—or no interference with his liberty, and his organs would rot in the ground anyway? A more moderate scheme involves taking organs from the dead when there is no expressed opposition.

Suppose it were true that society had a moral right to take even over the opposition of the original owner and family, but wished not to upset living relatives. Suppose, in addition, we knew that relatives would be more likely than the original owner to agree to let organs be used, and that the original owner had not explicitly refused. Society could then grant the family a legal right to decide. In this case, the family's legal right to decide is derived from society's prior moral right to take and certain information about probable family behavior. As long as enough organs for transplantation can be gotten from families willing to give, society's moral right to take independently of family consent and the lack of any fundamental family right need never make any practical difference (15). Three conditions should limit such a granting of rights, however. First, although society may often permissibly override the original owner's express desire not to donate, it seems inappropriate for individuals who should have stood in an egalitarian relation to the original owner to be granted that power. Second, granting the family the right to override the original owner's decision to donate would hinder the goal of acquiring organs as well as wrong the original owner. Third, a policy requiring us to request organs from families, rather than waiting for volunteers, seems best.

Although society might permit the family to make the decision, the family may wish society would not do so. Contrary to the opinion of the Report that families find solace in giving a relative's organs, responsibility for donating organs may produce great strain in a family member. Indeed, the individual who faces impending death may himself find deciding to give organs too great a strain. This strain could exist even if, when considering the matter prior to being called upon to make a decision, everyone in the society believed it would be best for organs to be removed and transplanted, and even if, when a decision does have to be made, family members (or the original owner himself) wish the organs were removed, though not by their directive. Everyone could want to be forced to do what they cannot bring themselves to do voluntarily.

To avoid the strain of actual decision-making, individuals could make the decision ex ante that government should take the organs when a death occurred. Here, instead of the society simply taking organs for reasons of necessity, the citizenry is granted the right to vote on the specific policy of taking on occasions when it is necessary.

Even if one did not believe society had a right to take organs, one could derive society's right to take via individuals' ex ante decision to cede their decision-making authority to the government, in order to avoid the strain of actually donating organs which ex ante they think they should donate. At the time of a particular taking, consent would be presumed, though some right to object could be allowed. (We would not presume general consent independent of the vote, however.)

If these are good arguments for simply taking organs, perhaps they are held in check to some degree by trying to understand some people's discomfort with even the voluntary donation of body parts. The problem in understanding this discomfort lies in locating some serious non-injury, non-liberty-violating, non-property-right-infringing harm that would befall dead persons when we take their organs for use, a harm that does not befall them if their organs rot in the grave instead. One suggestion is that the harm consists in the fact that the use-history of something the person was intimately connected to (or that actually was the person when alive) does not end with the person's history.

One's relation to one's body is regular, intimate, and associated with the person one is. If we take the parts and give them to others (but not if we let them rot in the ground), we prevent their use-history ending with the person, whether or not the dead person knows it. Their identity as the person's alone is not retained. Furthermore, if we take organs of the dead for use by others, the bodies of those who are still alive could be thought of as on loan to them, something to be used for a while that must then be passed on to others. Our treatment of the dead changes our attitude to our own bodies while we are alive.

A person may have a more intimate relation to some body parts than to others, identifying more with one part than with another. For example, if total face transplants were physically possible, there might be many more refusals to donate than there are for kidneys. This suggests that the more we "see" the person himself in the body part, the more significant it is to take it after death for someone else's use.

Therefore, unlike the property right we infringe when we take a toothbrush, significant harm can be done to a dead person when a body part is used by another: The use-history of an item intimately related to the dead person does not end when he dies, and this is worse if the item was more tied to the person's identity. Of course, people do give up intimate things that have been theirs alone. The claim is only that the act of detachment involved in this giving-up can involve a significant sacrifice, even when the person would no longer be able to use the item himself, and it would be destroyed. Furthermore, the location of a significant harm that can occur if organs are used by others does not imply that if the need is great enough we may not simply take. We just understand better the loss involved.

Are there other sources of discomfort with even consent to use of organs from the dead? Suppose we buried people's organs, so their use-history ended with the person, but we dismembered the various parts of the body before burying them. The fact that the person's body had been dismembered might be disturbing to many. Is the fact that the whole decays gradually crucial then? But suppose we did not bury bodies, rather allowing them to decay gradually in our presence. The fact that we saw the person's body come to naught might be disturbing. (Likewise, dismemberment of inner organs might be less disturbing than apparent disfigurement.) The crucial point seems to be that the last contact of the living with the dead should be with what seems to be an intact body; anything else may take away a continuing illusion of life. People may prefer that the undeniable evidence of death in a dismembered or decayed body come to exist beyond sight, and perhaps even be imagined as happening at a point in the future when the death has faded from memory somewhat (16). If such reactions exist—the practice of cremation raises a question about whether people react that way—should they not be grounds for speaking of harm, or perhaps only offense to the living, not the dead, in the taking of easily visible organs.

Emphasizing Individual and Societal Rights, Not Family Rights. I recognize that these views may go against the current social grain, which tends to deemphasize the individual and the impersonal state and emphasize middle-level social units such as the family. Nevertheless, I believe we are morally most justified in emphasizing donation from the original organ owner and instituting policies which ensure that his wishes are carried out, that is, allowing potential recipients to sue if the decedent's desire to donate is not acted on. We are also justified in deriving society's right to take from social need. Locating in the next of kin a fundamental right to make donation decisions, especially decisions that override an original owner's desire to donate and are not based on the principle of substituted judgment, seems less justified. So does deriving a family's right to decide directly from society's need for organs. For surely a social need would most directly give society, not the family, a right.

The view presented here is twofold. First, persons have a property-like relation to their own body, but the family does not automatically have similar property-like rights in a relative's remains. Second, social need may sometimes override the original owner's property rights. Society's rights to take organs from corpses is closely connected to the fact that taking organs from the dead is a non-liberty-violating, noninjuring transgression, though it can be a property infringement and an attack on our intimate relations with our bodies. Furthermore, out of respect for the family's feelings and the desire to increase the supply of organs, the original owner, or society, may grant the family a right to decide on the disposition of organs. But society should not grant families the right to override the original owner's decision, negative or positive. And required request should be the rule. Family members and original owners may also decide, ex ante, to avoid the strain of an actual decision and so empower the government to take.

In fact, families seem to have been given the right to decide because it is believed they are likely to give when original organ owners would not. Therefore, they cannot be seen as playing the role envisioned by substituted judgment—figuring out what the original owner would have wanted. If substituted judgment is not the source of their right, the family can have the right to decide only because the state has a prior right to take organs and delegates its power. If we give the family decision-making power, rather than make greater efforts to inquire into the wishes of the original organ owner, the state is, in effect, seeing to it that the wishes of original organ owners are circumvented by never being made explicit. Therefore, even if we do not allow families to override explicit refusals by original owners, the state would still be using families to circumvent the wishes of the dead and letting families serve as agents of the state's right to override the decedent's wishes. Those who oppose the state's right to override or circumvent should then oppose the family's right, except when substituted judgment is operational.

Distribution

Need. At least two subquestions are imbedded in the question, "Do these people need an organ equally?" Subquestion 1: Do they need an organ equally to survive? Subquestion 2: Do they need to survive equally? The answer to the first question may be Yes, while the answer to the second question may be No. Two people may need the organ equally in order to get what the organ can give (more good years), but they may not need more good years equally.

The Report's notion of need is derived from subquestion 1 in that its notion of need is concerned with who will die sooner, and who will have the worst future. The judgment of need is here being made in a forward-looking way. But there is an alternative account of "most needy" that arises from considering subquestion 2. The person who will die having had both the least opportunity for goods of life and the least goods has the greater need not to die. He has the strongest need for the organ and needs most to be saved, assuming he will then have an opportunity for goods of life (17). Among other results, employing this standard will, more often than not, mean helping the younger rather than the older patient.

If we employed this new notion of need, and retained the Report's view, which implies that a better outcome means additional quantity or quality of life, then, if need took precedence over outcome, we might have to produce a less good outcome in order to satisfy a greater need. This could occur if a young person would be helped to live only a short additional period, whereas an older person would live longer (18).

Furthermore, if need is a function of opportunities for and enjoyment of goods and if need takes precedence over best outcome understood as additional quality or quantity of life, the requirement of perfect tissue-typing should be forgone (or at least modified); this would give the neediest a chance at a good they might otherwise be totally denied. In general, the emphasis on perfect tissue typing reflects at least in part a concern with achieving the best outcome. Even if we accept the Report's own notion of need, favoring the better tissue typing puts outcome ahead of need. (If the concern is that incorrect typing produces sensitization and, therefore, might make a person worse off than he would have been, this indeed is not a concern merely to achieve the best outcome. The fear of sensitizing someone seems misplaced, however, if his alternative is death.) Furthermore, if the use of immunosuppressive drugs could prevent rejection, only concern for the best outcome (a life closest to normal because there was no need for the drugs) would justify insisting on perfect tissue typing as heavily as the Report does (19).

Having suggested an alternative notion of need, let me now try to speak in favor of the Report's emphasis on need understood as likelihood of immediate death. It is possible that the quality and length of life a patient has already enjoyed pale into insignificance in the face of the prospect of total extinction. Because someone has had more of the goods of life should not make facing total extinction more likely than for someone else who has had fewer goods. Whatever good has already occurred to the person can fail to be relevant in comparison to the evil at stake, even if the good added to the evil make one life much better than another overall (20).

It is hard to accept such a view in the case of death. Since a large part of what makes death bad is that one has no more time alive and hence no more goods of life, and since the amount of additional time and goods at stake is always finite, the significance of the loss of future years and goods should vary with how many years and goods one has already had (9, 21, 22). We cannot just ignore a person's past, treating past goods as though they had not been enjoyed.

Use of Type O Products. The Report provides two directives for the use of material from blood type O donors: (a) O material should be offered first to suitable O recipients (p. 82), and (b) O material should be offered only to O recipients (p. 74). Obviously these directives have inconsistent implications, since policy b would require that we never use O material on As, but policy a would permit such use provided that no O recipient was either available or expected to be available in time to use the organ. (Policy a is obviously better in this respect.) Both policies, however, conflict with the preference given to urgent and sensitized individuals. This is because, if urgent or sensitized persons were A type, O material would clearly not be offered to them by policy b and would not be offered by policy a if "suitable" does not include "as great need as others." In any case, the policy for disposition of O material is not clear in the Report. The most reasonable policy seems to be: "Offer O material first to an O recipient as needy as other potential recipients (perhaps with as good an outcome), where 'as needy' includes 'as urgent' (die very soon if not receive an organ) and 'as sensitized.' " Such a policy makes sense given that the urgent or sensitized one is most likely to die before getting another organ.

Line-Jumping. Line-jumping in situations of critical organ scarcity involves imposing at least an additional probability of death on someone who has been waiting, while eliminating an even higher probability of death for someone who has not been waiting as long. Length of time waiting should at least count in favor of limiting the increase in probability of death which we may impose on someone by jumping over him.

Furthermore, if we know that one of those jumped over will definitely die before another organ is found, a jump makes no sense so long as the time he will have had alive, beyond what the jumper would have if not jumped, is not significant. In such a case there is no real difference in need after all between the one jumped and the one jumped over.

Conflicts of Need and Outcome. Accept for the sake of further discussion the Report's use of "need" and "outcome." The Report emphasizes a possible conflict between need and outcome, since those who would die soonest usually have the worst prognosis. The Report notes the pressure toward helping the neediest, whom we can refer to as "the worst off," and recognizes that even patients seem to prefer that the worst off be helped first. Putting aside the preferences of other potential recipients, how should we deal with conflicts of need and outcome? Consider some hypothetical cases:

Case 1. Suppose we must choose whether to give an organ to (a) someone—a person who will die tomorrow if she does not receive a transplant and will live three weeks if she does, or to (b) someone—a person who will die in a year if he does not receive a transplant now and live twenty years if he does (23). Even someone who would ordinarily favor treating first those who would be the worst off (the "maximiner") will, I believe, decline to give the organ to (a), probably because the gain to (a) is not significant even to her, relative to her position if not treated.

Case 2. Suppose we must choose whether to give an organ to (c) someone—a person who will die tomorrow if she does not receive a transplant and live one year if she does, or to (d) someone—a person who will live one year if he does not receive a transplant and twenty years only if he receives one now. In this case, it might be argued, concern for taking care of the worst off first (the maximin solution) could reasonably determine a solution because the gain to the worst off is significant to her (a year) and because the decision to give it to (c) expresses a concern for equality between persons. That is, we first see to it that (c) has at least as much time alive (an additional year) as (d) does before giving (d) more than a year.

If maximin is the just way to distribute a scarce resource in this case, we may face a conflict with doctors' desires to take pride in the best technical exercise of their skills. That is, maximining in case 2 will require doctors to put aside the pride they take in producing the longest possible life.

Case 3. Consider a type of case in which, I believe, the maximin solution may conflict with equality. Suppose we must choose whether to give a scarce organ to (e) someone—a person who will die tomorrow if not treated but live twenty years if treated, or to (f) someone—a person who will die in one year if not treated but live twenty years only if treated now. (The option represented by (e) conflicts with the real-life truth that urgent cases most often have poor outcomes.) In this case, I suspect that we think equality is better served by tossing a coin between the two parties rather than maximining. Why do we think this? One possibility is that in (e) the potentially worst off person, the one who will have less additional life if not treated, will, if treated, turn out to be better off than—not merely as well off as—the untreated person. The difference between (e)'s twenty years if treated, and (f)'s one year if not treated seems to be much greater than the difference between (e)'s dying tomorrow and (f)'s having one year alive without treatment. That is, the difference (one year) we are trying to compensate for if we follow a maximin policy is much less than the difference we create. The thought then is that if, without treatment, (f) will have one year, whereas (e) will having nothing, this shouldn't mean that (e) gets treatment that gives her twenty years when (f) will have one year, especially when (f) also stands to gain nineteen years for a total of twenty if he is treated.

A problem is presented for this analysis, however, by a case in which (f) would die in a year if untreated, but survive for two years if treated, while (e)'s prospects remain the same as described above. In this case it is also true that helping (e) would create a difference between (e) and (f) greater than the original inequality. Yet I believe we should here treat (e). Is this simply because we can thereby produce many more good years (twenty vs. two)? Or is it because what (f) stands to gain if treated is not much more than he would get if not treated, implying that the fact that someone would have (or has had) only a small percentage of the good he could potentially get (e.g., one year of a potential twenty) should not be held against him in deciding a contest for organs, and indeed should help his case.

The correct alternative, however, to giving (e) and (f), as originally described—each standing to live twenty years—equal chances for the organ may be to give weighted chances that reflect the slightly greater importance to (e) than to (f) of the additional twenty years. So we may give (e) a greater chance to win by putting her name on more straws in a hat than we put (f)'s on.

In thinking about this issue we need to sort out the roles the following four factors play: how many good years in absolute terms we could produce in each life; how what we do affects the equal standing of different individuals; how what someone will get if we follow one course compares with what he could get if we follow another; and what someone will get in absolute terms if we follow one course rather than another.

If we toss a coin between (e) and (f) in case 3, we are again in conflict with the doctor's desire to make the best use of her technical expertise, since she maximizes the number of extra years produced over all (though not years in one person) if she lets (f) live one year naturally and gives the organ to (e)—the maximin solution. Case 4 elaborates on this problem of not maximizing years saved.

Case 4. Suppose we have (g) and (h), two equally needy candidates for an organ who both will die tomorrow if they do not receive an organ. If (g) receives a transplant, she will live one good year, whereas if (h) receives a transplant, he will live twenty good years. Where there is no conflict with need, the Report would recommend going with the best outcome. Should we (22, 24, 25)? Someone who thought not might give the following argument: To pick (h) automatically is to take the social viewpoint according to which all that matters is that somebody gets to live the most years. It is true that this is also a satisfactory outcome from (h)'s personal point of view. But what of (g)? It is not satisfactory from her personal point of view since she will die having lost out on the significant gain to her of one year (26).

It might be suggested that, once the gain to

(g) is significant enough so that she would not be obligated to sacrifice it to help save (h) from death, we third parties should toss a coin between (g) and (h). Notice that this suggestion does not depend on the claim that (g)'s one year is as significant to (g) as (h)'s twenty years is to (h). It could be argued that this is (usually) a false claim, since a twenty-year gain to (g) would be more significant to (g) than the one-year gain is to her.

An objection to tossing a coin between the equally needy individuals suggests that, from a position in which we were ignorant of both the particulars of our own future and our own present circumstances, and hence could make an unbiased decision, we would choose both a maximin policy and a policy according to which, of two equally needy individuals, the one standing to gain the most is aided. The latter policy would be chosen (very roughly) for the following reasons: One would have had no more reason to think one would be in the position of one individual rather than the other; one would care more about getting twenty years of life than one year; and so one would want to maximize one's chances of getting the thing one wanted most. This could be done only if one arranged for a policy that gave highest probability to helping the person who would live the longest (27).

This objection is based on a particular sort of understanding of decision-making behind what John Rawls calls a "veil of ignorance." The veil denies to the deciders knowledge of many of their own characteristics, such as health, age, sex, income, intelligence. This helps insure that in deciding on principles for the distribution of goods, no one will offer principles biased to favor his or her own circumstances. However, Thomas Scanlon (28) has argued that one way of deciding in ignorance by supposing that one might turn out to be any of the persons who will be affected by a policy is different from deciding in ignorance by taking seriously how the policy affects each person who will be affected. When the individuals involved are considered as truly separate persons, not positions that one person, reasoning behind the veil of ignorance has an equal probability of coming to occupy, the conclusions are different. Scanlon's exposition of reasoning behind a veil of ignorance does, I believe, again present us with the possibility that we should treat (g)'s loss as seriously as (h)'s. (This also depends on our not taking seriously the idea that nature has given (g) an equal chance of being in (h)'s position as well as her own, for if we believed it did, we should not have to toss a coin to give equal chances again.)

A different counterargument to the radical conclusion that we toss a coin between individuals each of whom stands to gain something significant to him suggests that we, as third parties, should not act by giving equal weight to the personal points of view of (g) and (h). Rather we should take a more objective view, and accept that whoever is saved, at least one year *is* added to someone's life. This is true even though, from (g)'s personal point of view, if (h) is saved, it will be almost as if no one is saved. Then we must consider the additional nineteen years of life we could save by choosing (h), and ask ourselves not only whether (h) himself should have to sacrifice nineteen additional years so that (g) may have an equal chance to live, but whether we show sufficient concern for the value nineteen years has to (h) if we value (g)'s equal chance for one year more. If we say no, we shall automatically save (h). If we ask these questions, furthermore, we shall not always choose the individual who would receive the best outcome, since the difference between what he would gain and what the other person would gain may be small enough so that it is, in itself something that either he should be willing to lose or something we, as choosers, should value less than someone else's having an equal chance for a significant good.

An attempt to reinforce this argument might be made by noting that we would ordinarily save the person who would suffer a greater loss, the person for whom the decision makes the most difference. Therefore, since losing twenty years is a greater loss than losing one year and the difference the decision makes is one year for (g) but twenty for (h), we should help (h), not (g). The peril of using this argument, however, is that in cases where we typically help the person who will lose the most, we prevent the greater loss when it signifies that its sufferer would be worse off than the sufferer of the lesser loss. But, in our case, (g) and (h) would, by hypothesis, be equally badly off (dead) though one will lose out on more in getting to that position than the other.

Louis Kornhauser (personal communication) suggests that we say that, ex ante (h) will be worse off than (g), because he stands to lose more, and ex post (at death) (g) and (h) will be equally badly off. We make our decisions ex ante, therefore we should help (h). While I agree that more is at stake for (h), I am not certain that even if he were worse off ex ante in losing out on more real possibilities, this would be enough to say that he is sufficiently worse off than (g) to automatically give him the organ. When one's goal is to avoid death, ex ante the time beyond any significant period which puts off death may have diminishing value. At the time we must choose between (g) and (h), (g) might be willing to pay almost as much to get the one year as (h) would to get the twenty; it is because all she can get is one year that this is true. This consideration is consistent with (g) valuing twenty years for herself more than one year, and with it being true that someone will probably choose life-threatening surgery to increase his life prospects from one year to twenty.

It also seems odd to say that a person will be worse off, relative to another, on the basis of the fact that he has more wonderful possibilities that will not be realized. On the contrary, it seems we should be more concerned with whether someone will face a truly horrible outcome (death shortly, or base poverty) than with whether he has lost out on a truly magnificent outcome in deciding how badly off someone is.

Even if we accept that it is more horrible to wind up in dire straits by losing out on magnificent possiblities, I do not believe that it is because we think (h) would be so much worse off than (g) if we didn't select him that we give him the organ. Rather, I believe, we think we might as well shoot for the magnificent outcome as well, because someone will have to face dire straits no matter what, and we get the bit of good, represented by one year of life, no matter what we do. These facts make us ignore the other fact, that (g) and (h) are different persons and that (g) wants her equal chance to avoid the dire straits and get a significant good. Also, if we give the organ to (g), a year later when she must die, we will feel most intensely that we paid for that year with nineteen additional years of life that would have been possible for someone else (29).

Money. As noted above, the Task Force did not believe that a fair distribution of organs would result from distribution according to ability to pay (strictly speaking, actual payment). Distribution only to those who can pay would be "wealth discrimination." It seems peculiar to think that not giving things free to people who cannot pay is a form of discrimination of the same sort as race discrimination. Only when a characteristic is not relevant to what is to be distributed does nefarious discrimination exist. The assumption that need alone should determine distribution of health resources overlooks the fact that these resources will have to be paid for somehow, and it may be morally inappropriate to expect one person to pay for another. The Report argues for government-subsidized organ transplants for those who cannot pay or have no insurance. In my comments I consider the role of money in general and some Report arguments in particular.

Is there a conflict between (a) helping the most people who most need organs or whose outcomes will be best, and (b) not distributing organs on the basis of ability to pay? Consider the following case:

A very rich person (R) and a very poor person (P) both need the only suitable organ now available and they will die tomorrow without it. Twenty other people are also about to die because the government does not have the money to pay for their life-saving organ transplants. Suppose that, if we sell the organ to R at a very high price, the money from the sale will be used to finance the procedures that transplant organs to the twenty other people. Why should we not see the choice between giving the organ to R or to P as a choice between saving P and saving twenty-one other people's lives? Might justice recommend saving as many lives as possible by distributing one organ in an unfair way? Even if R did not in fact need the organ as much as P does, selling it to R will still save twenty lives, whereas giving it to P will save only one. Why should we not analyze the situation as simply involving a fair choice between saving one versus saving more lives? (30).

Those who think it permissible to sell the organ to R in these cases, if (and only if) the money is used for the twenty, should, I believe, be in favor of holding occasional auctions (31) at which organs are sold to the highest bidder. Some who need the organs more than the highest bidders will not get them, but more lives will be saved over all, so long as the money is used properly. Would occasional auctions be morally inappropriate because they involve taking money for an organ that is a gift from a donor? Why should an altruistic donor object to his organ being used to save the maximum number of lives? The auction runs, after all, on the same principle as Goodwill Industries or other charities. In these charities, a donor may give a coat to the charity at no charge. The charity may sell the coat to the highest bidder who is not in great need, and then use the money to buy other things for many needy people. Furthermore, the needy person who would have gotten the coat had there not been an auction or sale may not be among the eventual recipients of the goods purchased with the coat money.

If the auction is not permissible (as I believe it may well be), its impermissibility must have something to do with deep objections to simple consequentialist reasoning which considers only the best overall outcome. It must have something to do with its being impermissible *not* to give the organ to the person who needs it most or to select between equally needy people by seeing them as means to some further end rather than as ends in themselves. Those who think that holding an auction is impermissible must also distinguish that procedure from others in which an increase in good consequences would be a legitimate reason for distributing a resource in a given way. For example, it is permissible to use an organ to save twenty people rather than one, if the single organ itself could be used to make a serum that will save all twenty lives.

My aim here is not fully to explain such objections (22, 24, 25), but to make clear that we may lose a medically better outcome (more transplants performed and more lives saved) by always distributing organs by need. Such distribution may, nevertheless, be morally correct because it is fair. The Report, then, fails to notice that there can be conflicts between the goals it says we should set ourselves: distributing organs fairly (repeatedly emphasized) and distributing organs "in a manner that accomplishes the greatest good for the community" (p. 77).

On the Governmental Obligation to Fund Organ Acquisition and Transplant Surgery. Having dismissed any distribution according to ability to pay that excludes those unable to pay, the Report provides three specific arguments for the conclusion that government should, if necessary, pay for all types of transplants. Although the conclusion may be correct, I wish to point out how the Report's arguments fail to prove it.

Argument 1. The first argument claims that, even without proof that our government is required to provide health care for the poor, it can be shown that a government that has already assumed a responsibility for "an adequate level of health care without excessive burdens on the ill person" (pp. 103, 104), as ours has done, has committed itself to all new procedures fitting that description and so has a responsibility to support organ transplants for the poor and uninsured.

Objection: Suppose transplants do fall under the description "adequate level of health care." It is still possible (and seems reasonable) that the duty assumed by the government was to provide for adequate health care only up to cost X. If the costs would increase beyond X by adding new transplant procedures, the government need not fund all, but may select among procedures in a fair way.

Argument 2. How could the government select among transplants? This question forms the basis of the Report's second argument for government funding. There is no relevant difference between procedures the government already funds (e.g. kidney transplants) and newer procedures; therefore it has no grounds for refusing funding to new procedures that would not also apply to already funded procedures (p. 104).

Objection: If there is an upper limit, X, on costs the government is obligated to bear, then, so long as it selects fairly among procedures, it may fund some and not all. Where no relevant differences are intrinsic, selecting randomly would be fair. Alternatively, older procedures already funded may be kept, and newer ones not funded, on the combined grounds of (a) efficiency of keeping in place what already exists, and (b) a sort of randomness of first come, first served which the Task Force itself recommends when organs are scarce with respect to patients equal in need and expected outcome. That is, whichever disease happened to get a "cure" first, gets funded. In general, given the reasonableness of the assumption that there was always an intended upper limit on required funding, one cannot generate additional governmental duties to fund simply by using a consistency argument.

Argument 3. The final argument used by the Report is supposed to derive a government obligation to fund transplants for the needy independently of the first two arguments—independently of the government's having assumed responsibility for health care and independently of there being no relevant differences between procedures already funded and those yet to be funded. The claim is that, because donors give organs as gifts, "we" owe it to donors not to distribute the organs by ability to pay. (This is broader than the claim it would be wrong for doctors to profit by charging for organs when the donors get nothing, since the money recipients paid for organs could go to a worthy cause.)

Objection: "We" cannot be put under a new obligation to spend in excess of any other required level of spending simply because a donor offers to give something that would be useful, when its being used would require us to expend additional funds.

Whoever has induced another person to donate a good by leading him to believe that the item will be provided free to the public, may, however, be required to accept the cost of putting the item to use. Therefore, if the government did induce organ donations by promising to give the organs away free and to fund their use in the needy who are unable to pay, it may then be obliged to pay costs. But then, if there is a spending level beyond which the government need not go and even ought not go (because, for example, it might be unjust to collect more taxes), the government should simply not encourage donations in that way.

This would not mean that a government that justly failed to fund some transplants could not encourage any gift donations of organs. It could explain to the potential gift donor that governmental payment for the needy would be wrong, but some individuals could themselves (for example, via insurance) afford to pay for a procedure they do medically need and by which they would benefit. Further, the government would funnel the organs to such needy people with the ability to pay. Shouldn't a potential gift donor under such circumstances still be willing to donate?

Finally, suppose an oversupply of organs, rather than the current scarcity, and suppose the government had met its limited obligations to pay for transplants before using all such organs. Would it be better to let the organs go unused for the sake of equality, or let those who could pay use them, though the poor could not be served (32)?

I conclude that, although there may well be arguments for the conclusion that the government should fund all transplants, the Report has not provided them. In general, it is harder to argue for publicly sponsored medicine than the Task Force seems to think. This problem, in conjunction with inconsistencies in recommendations for type O material, a problematic (though common) notion of need, and problems arising from possible conflicts between need and the pursuit of the best outcome mar the distribution section of the Report. In addition, the section on acquisition moves too quickly to emphasize the role of the family rather than the "original owner" and the state.

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References and Notes

1. Organ Transplantation: Issues and Recommendations. HEW Committee of Public Welfare, April, 1986.
2. As well as a Hastings Center report: Ethical, legal and policy issues pertaining to solid organ procurement, The Hastings Center, October 1985.
3. A linguistic oddity: the Report here uses the word "donor" for someone whose organs are taken though he or she does not personally donate them.
4. What if someone on the line or off it develops prospects for the best outcome? Should that person jump the line? I do not think the Report gives a clear answer. It might be that expected outcome is used in forming a line, but not for line-jumping an established list.
5. The Uniform Anatomical Gift Act, 57 Geo. Law Journal 5(1968–69). Sect. 3, no. 4.
6. It might also have a chilling effect on honesty and dissent in human relations. If we feel our lives are at the mercy of others' free choice, we may be afraid to speak and act as we believe we really should.
7. As was emphasized to me by Louis Kornhauser. In fact it is claimed that under current policy, blacks and women are much less likely to get organs than white males.
8. Nagel T. Death. In: Mortal questions (Cambridge University Press, 1979).
9. It has been argued that the right (and duty) of relatives to bury a relation indicates only a quasi-property right, not full-blooded ownership: Sadler M, Sadler B. Transplantation and the law: the need for organized sensitivity. 57 Geo. Law Journal 5(1968–69).
10. Dukeminier J. Supplying organs for transplantation, 68 Mich. Law Review 811 (1970).
11. Weller T. The book of stupid questions. Warner Books, 1988.
12. The Report itself requires such an analysis in its discussion of the distribution of some U.S. organs to nonresident aliens (pp. 93–5). It suggests that we give a certain amount to aliens of other countries for altruistic reasons and encourage other countries to reciprocate, yet consider not giving aid if other countries do not reciprocate. Encouraging reciprocation in others does not cease to be altruism and become a mere insurance scheme if countries who truly cannot donate are still not denied benefits.
13. In fact, beliefs about the insignificance of the harm are the most relevant. If someone believes that great harm would come to him, e.g., the absence of a complete body at the time of Resurrection, his body should not be taken. A public debate over the truth of the belief would be too costly.
14. Thomson JJ. Some ruminations on rights. Arizona Law Review, 19 (1977).
15. If our behavior remains the same, why bother to discuss the issue? Because the philosopher and a reflective society are interested in why we may behave as we do. For discussion of this point in applied ethics see: Kamm FM. Ethics, applied ethics and applying applied ethics. In: Rosenthal D et al., eds. Applied ethics and ethical theory. University of Utah Press, 1988.
16. The sight of a nonintact body may be one of the causes of the discomfort experienced in seeing relatives hooked up to machinery in an intensive-care unit; here the last experience before death does not maintain the impression of ordinary life.
17. An alternative "most needy" is the person who will have had least of the goods of life (despite opportunity for

them) if he dies. There are other related alternatives. I chose my wording to avoid two problems: (1) if someone has had the least opportunity for goods of life but managed to get the goods anyway, it would be foolish to call him most needy; (2) if someone has had few of the goods of life but much opportunity for them and was at fault for not acquiring them, it seems wrong to treat him as most needy.

18. This approach might be extended so that someone who would not die now, but would die after a low-quality future if not given the organ, is preferred for a transplant over someone who would die now but has already had much good in life.
19. A selection procedure described by doctors at the University of Pittsburgh does not so heavily emphasize perfect tissue-typing. Rather, points are awarded by degree of matching, but can be overridden by points for other considerations. In their system no lexical priority is given to any one factor, though their rationale for assigning as many points as they do to different factors is not clear. See: Starzl T et al. A multifactorial system for equitable selection of cadaver kidney recipients. JAMA 1987; 257(22).
20. This attitude, however, also seems to lead to the view that future quality of life should not count in selecting who will avoid extinction.
21. Kamm FM. Why is death bad and worse than pre-natal non-existence? Pacific Philosophical Q, 1988; June.
22. Kamm FM. Morality, mortality. Oxford: Oxford University Press (in press).
23. Throughout these cases, when I say someone will die in a certain length of time unless given a transplant now, I am assuming that no other opportunity to do a transplant will occur. This focuses the discussion on the significance of settled outcomes.
24. Kamm FM. The choice between people, “common sense” morality and doctors. Bioethics 1987; 1:255–271.
25. Kamm FM. Harming some to save others. Philosophical Studies (in press).
26. Some may think we ought to produce the greater number of years because longer life is clearly the better outcome, whereas we should not choose to prolong one life style over another because it is not clear what the better life style is. This is an inadequate view for several reasons. Sometimes it is clear that one person’s life style is better than another’s, but this may be irrelevant to a decision on who gets an organ. Furthermore, while knowing that more years is better than fewer would certainly make a decision easy if we were choosing among two options for one person, when two people are involved, choosing the objectively better outcome of longer life is not in the interest of the person who could be benefited by the worse outcome. It is this which raises questions about whether we should produce the objectively better outcome.
27. My phrasing of an objection raised by Norman Daniels.
28. Scanlon T. Contractualism and utilitarianism. In: Williams and Sen. Utilitarianism and beyond. Cambridge, England: Cambridge University Press, 1982.
29. But we did not give up outright nineteen years for one; by adopting the coin-tossing alternative we retained a 50% chance of getting those nineteen years.
30. Kamm FM. Equal treatment and equal chances. Philosophy and Public Affairs 1985; 14:177–194.
31. Ability to pay might be involved in distribution in many ways besides auctions. Requiring payment for what the procedure costs, limited to those who need the organ and will have good outcomes, is still distribution by ability to pay, since those unable to pay will not get transplants.
32. In the auction case, the organ being auctioned could be one the government would have had a duty to transplant into the poor person if someone richer had not wanted it. In the case I am here discussing, money is buying an organ the government would not have had a duty to transplant—an organ that therefore would have been wasted.

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The History of Responses to Epidemic Disease in the United States since the 18th Century

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Abstract

History offers some guidance for understanding social and policy responses to the AIDS epidemic. Pertinent themes in the history of responses to epidemic disease in the United States in the past two hundred years include an initial underestimation of the severity of the epidemic; the prevalence of fear and anxiety; flight, denial, and scapegoating as a result of fear; efforts to quarantine and isolate carriers and the sick; the assertion of rational policies by coalitions of business, government, and medical leaders; the recruitment of a special cadre of physicians to treat the sick; the similarity of responses to both epidemic and endemic infectious diseases; and the high cost of epidemics, which is shared by government, philanthropy, and private individuals. However, until more is known about the natural history of AIDS, generalizations about past epidemics must be cautiously applied to our present circumstances.

The AIDS epidemic has stimulated renewed interest in the history of disease and of responses to it. For the past few years, scientific journals, book publishers, and the print and electronic media have devoted uncharacteristic attention to the history of past epidemics. The Presidential Commission on the Human Immunodeficiency Virus was obligated by its charter "to review the United States' history of dealing with communicable disease epidemics" (see article by Lee).

There are several obstacles to knowing what aspects of the past are pertinent to understanding, much less intervening in, the AIDS epidemic. The first of these obstacles, described in the first section of this paper, is the reluctance of good historians to go beyond their data and methods. Professional historians of medicine are keenly aware of the dangers of misusing the past. Just as important, as described at the end of this paper, our ignorance of the natural history of AIDS makes it difficult to decide which diseases in the past offer the most pertinent comparisons.

A few cautious generalizations can, however, be made about epidemics in the past. The purpose of this paper is to present and then briefly elaborate on eight of these generalizations. The main themes in the history of responses to epidemic disease in the United States in the past two hundred years are:

- At the beginning of most epidemics, many people, including many in medicine and politics, have underestimated the severity of the problem.
- Considerable fear and anxiety has accompanied the perception that an epidemic was gaining strength.
- Initial responses to fear and anxiety have included flight, denial, and scapegoating of alleged carriers of the disease, notably foreigners.
- Efforts to quarantine (separate people who may carry the disease) and isolate (set apart people with the disease) have usually been ineffective in limiting the spread of an epidemic.

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- After an initial period of denial or of panic, rational policies have been established during each epidemic, almost always by a coalition of business and government leaders, with support from prominent members of the medical profession.
- In most epidemics there have been shortages of physicians and nurses to treat the sick, especially the sick poor. Shortages of physicians have almost always been met by providing incentives, usually money and future practice opportunities, to physicians of lower status, often from another city or foreign country.
- Such endemic infectious diseases as syphilis, tuberculosis, and typhoid have posed many of the same problems of fear, denial, and mobilization as epidemics and pandemics.
- Epidemics are always expensive. They have exacted a heavy toll in direct costs (treatment and public health measures) and indirect costs (losses of productivity, especially of lifetime earnings). That burden has always been borne by government and philanthropy as well as by private individuals.

There is vast documentation for the generalizations in this paper. Rather than offer citations that are longer than the paper, a note on major secondary sources at the end offers guidance for further reading.

Central Concepts in the History of Medicine. Three important concepts in the study of the history of medicine have a profound influence on any attempt to derive lessons for the present from the past. The first concept is relativism, a word with precise analytical meaning in historical studies (in contrast to its controversial use in general discourse). In this context the concept of relativism means that how people perceived risks to themselves and others at different times in the past cannot easily be compared. We must try to see each society, each time in its own terms. Thus it is impossible to conjecture if we fear AIDS any more or less than Philadelphians or people in New Orleans feared yellow fever in the late eighteenth century. We do not know enough about people of another time to understand fully their concept of risk. We cannot say, for example, that people had more or less fear when their life expectancy was shorter, or when they knew less than we do about molecular biology. What little we know about this subject suggests that perceptions of risk, and the emotions they aroused, are more constant than changing. For instance, I am unaware of any evidence that parents were more callous about the death of children from infectious disease when more of their offspring died in infancy.

The second important concept is the problematic idea of progress. Whatever any of us believes about the achievements of modern medical science, it is bad historical analysis to dismiss events in the past because people had less sophisticated knowledge. Contrary to mythology, the germ theory of disease did not suddenly replace medical ignorance in the nineteenth century. People in the past had serviceable medical theories that explained to their satisfaction the origins and course of epidemic diseases. They also had treatments that they believed had some degree of effectiveness. Before we dismiss people in the past as suffering from ignorance of medical science, we should ponder the overwhelming evidence compiled by historians and epidemiologists that mortality from most infectious diseases since the nineteenth century has fallen mainly as a result of dietary and environmental change rather than of medical measures.

The third concept is the danger of presentism. The goal of most modern historical studies is to understand the past on its own terms, rather than seeing it through the concerns of the present. Most professional historians hold that investigations of the past that begin with questions about the present are inevitably biased and are, therefore, bad science. In this paper I present some lessons of history; but the data I summarize were gathered and interpreted by historians who tried to see events in the past through the eyes of contemporaries. Thus it is not possible to find all the lessons we would like.

Underestimating the Severity of Epidemics. Most human beings resist change. Thus it is not surprising to find that, in the early stages of most epidemics, leaders of business, politics, and medicine have often taken comfort in the reassuring notion that rumors of what was coming were exaggerated. These leaders were well aware that past epidemics, particularly those which arrived suddenly, disrupted commerce and civic life. They were eager to avoid hastening new disruption by seeming to encourage panic.

Commerce has been the most important carrier of epidemics. Epidemics have spread through people or goods moving on ships in past centuries; on jet planes more recently. The paths of epidemics have always been the routes followed by trade or, in wartime, by troops. Business and civic officials have understandably never been eager for the results of disrupted commerce—unemployment and hunger, as well as losses of profits and revenues. Thus in most epidemics they have initially been cautious about actions—quarantines, embargoes, travel restrictions, for instance—that would limit economic activity. Moreover, physicians have often agreed with them as a result of their own experience with the vagaries of infectious disease; false alarms have occurred more frequently than epidemics.

There have often been conflicts within the medical profession in the early weeks and even the early months of an epidemic about just how serious it would be. Because of these conflicts, business and civic leaders have been justified in urging caution. To cite just one example: in New York City in 1832, the Physician of the Port—the highest ranking public health official—refused to accept diagnoses of Asiatic cholera for several weeks after other prominent physicians were convinced that people in growing numbers were dying from the disease.

Fear and Anxiety. Fear and anxiety have rapidly replaced underestimation and the hope that disruptive change would not occur. By definition an epidemic is beyond the current knowledge of the medical profession. That is, either the cause, or the cure, of an epidemic is unknown (in some instances, like influenza in modern times, the cause can be rapidly found and a vaccine created). During the period of fear and anxiety, conjectures about the causes of the epidemic have been frequently debated. In eighteenth and nineteenth century epidemics, for example, ministers and priests frequently claimed that disease was divine retribution for sin. Because epidemics have always (except for polio) been more severe among the poor, and because more poor people than those in higher classes were perceived to be immoderate drinkers, moralists blamed alcohol for creating susceptibility to infectious disease. Similarly, sexual desire has been considered a cause of disease, from the emergence of syphilis in the sixteenth century to the current AIDS epidemic. In an atmosphere of fear and anxiety, it has proven difficult for most people to appreciate the distinction between sexual desire and particular sexual behaviors.

Flight, Denial and Scapegoating. There has usually been considerable social turmoil during the episodes of fear that followed periods when people underestimated the extent of epidemics. Many affluent people—along with their physicians—have tried to escape from epidemics. There were reports from small cities (Memphis, for example) during nineteenth-century yellow fever epidemics that all the physicians in the town left with their patients. For people who could not flee, denial was often a convenient weapon against turmoil—the belief that the disease would not strike me because of some previous immunity, or because I was religious, or simply because I chose not to think about it. Denial was sometimes a cause of self-indulgent or criminal behavior.

The most destructive social response has been scapegoating, the belief that a disease was carried by a particular group of people because of their inherent characteristics. Most of the scapegoating in United States epidemics has been targeted against recent immigrants. Sometimes physicians were the scapegoats to be stoned or beaten. In a climate of fear, message and messenger are easily confused. Immigrants "carried" disease because they travelled the same route that trade did. Similarly, physicians were perceived to carry disease because they treated the sick.

Scapegoating has been more remarked upon during the AIDS epidemic than in many of those in the past. This may be because many Americans have strong negative feelings about homosexuals and about minority groups whose members are most susceptible to intravenous drug use. Because of such feelings, it is difficult now, as it was in the past, to separate the virus and its modes of transmission from the people who unwittingly, and against their self-interest, carry and suffer the disease.

Quarantine and Isolation Are Only Partially Effective. Quarantine and isolation are the oldest public health measures against epidemics. They were first used by prosperous Italian city-states to defend against the Black Death of the fourteenth century. They were ineffective remedies then and, though frequently used in subsequent centuries, they have usually produced considerable activity but few results.

The principle underlying quarantine and isolation seems to be plausible: separate diseased from healthy people. Unfortunately both the organisms that cause infectious disease and human nature have impeded the implementation of this principle. The organisms have escaped containment. Either they were transmitted across the quarantine or isolation (by mosquitos in yellow fever, droplets in the air in influenza) or they remained within the carrier after restrictions were relaxed (for example, cholera virus, which could be carried by people immune to the disease and then deposited, through excrement, in the water supply). Isolation of victims in their homes—during outbreaks of bubonic plague, for instance—sometimes enhanced the spread of disease by making family members more susceptible to it. Human nature has also impeded successful isolation and quarantine. Sanitary blockades have always been outsmarted. People have resisted incarceration or travel restrictions; governments cannot always be vigilant at frontiers and, especially, within their borders.

Rational Policies: Business-Civic Coalitions. If the story of the initial phases of epidemics is disheartening, what has followed immediately afterward inspires admiration for the resiliency of our institutions. From the eighteenth century to the present, Americans have followed the pattern of mobilizing for epidemics pioneered by the Italian city-states in the previous four centuries, the same patterns that also influenced the policies of city and central governments in northern Europe.

The Italian city-states' public health practices were particularly suited to the United States because they were rooted in republican assumptions. In the Italian pattern, after the initial period of underestimation and then fear of the epidemic, a coalition of commercial, civic, and medical leaders took control of policy-making and implementation. These groups were ad hoc, but in a narrow sense. The individuals knew each other well, were often related by blood or marriage, and were leaders of trade as well as government. Even the physicians often had interests in commerce. These local coalitions organized services, recruited and compensated additional health workers, deployed police and local troops to prevent violence against physicians and foreigners, and saw to it that the dead were promptly and properly buried.

From the eighteenth to the twentieth centuries, civic leaders created similar coalitions in the United States during epidemics. The accounts of local responses to epidemics are uniform. After a period of fear and uncertainty, a committee of commercial and political leaders would organize and begin to communicate with the public at meetings and through the press. The committee would convert empty buildings into temporary hospitals and establish clinics in police stations and schools. The committee would also recruit physicians and nurses to staff the temporary facilities by offering them incentives (see below). When burial services were overwhelmed, or undertakers refused to touch diseased bodies, the committee would enlist volunteer labor. The committee also oversaw the distribution of food to the poor and the provision of housing for the homeless.

This pattern became a permanent part of government from the late nineteenth century through the first half of the twentieth. The disastrous influenza pandemic of 1918–19 provides examples of both the old and the new. Because the nation was at war and the disease struck hardest at young men in training camps, there was a rapid military response. Moreover, many of the most prestigious physicians in the country were in uniform. In addition, the Army Medical Corps had enhanced its reputation during the conquest of yellow fever under Walter Reed and his colleagues in Havana and the Panama Canal Zone two decades earlier. Nevertheless, as the seriousness of the epidemic became evident, commercial and civic leaders mobilized as they had in the past. In city after city, campaigns were conducted to persuade—or force—people to wear face masks in the street, at work, and on public transport. Though the masks proved to be useless against infection, they became badges of civic solidarity. They linked the institutional response to influenza to civic action during the great yellow fever and cholera epidemics of the past.

The most conspicuous evidence that the traditional response to epidemics had been routinized was the creation of state and local health departments and the renaming and strengthening of what is now the U.S. Public Health Service. From the late nineteenth century on, more and more cities and states created health departments. These organizations were given responsibility for continual surveillance of infectious disease and, increasingly, for providing immunization (when available) and care at public expense for the poor. Beginning in the late nineteenth century, what is now the Public Health Service was given responsibility for screening immigrants for infectious disease, for laboratory research on causes of infection, and for coordinating the surveillance and control of infection with state health departments. By the mid-twentieth century, the tradition of creating ad hoc local coalitions to fight epidemics had been superceded by what seemed to most outsiders the unexciting competence of professional public health officers. State and local health boards and councils survived as the only reminders of the mechanisms of the past. The decline of the traditional mechanism was also hastened by the widespread—and inaccurate—belief that medical science was now able to discover rapidly the causes of infectious diseases and quickly devise vaccines to prevent and drugs to cure them.

Shortages of Health Workers. A major problem for both traditional civic coalitions and modern departments of health has been a shortage of health workers during epidemics. The Italian city-states provided the models for practical policies to recruit physicians during epidemics. As early as the fourteenth century, Italian civic committees induced physicians to treat the poor by offering them cash and promising that physicians who migrated to the city during epidemics would be licensed to practice there afterward. Only in a few instances were physicians required by law to treat the sick during an epidemic. There is no evidence that these statutes were effective.

"Plague doctors" have been recruited during every American epidemic for which records are available. For instance, in the great Philadelphia yellow fever epidemic of 1793, civic leaders hired a recent immigrant from Santo Domingo—who had been trained in Paris—to work full-time in the temporary hospital. The leaders acted after local physicians could manage to spend only a few hours attending patients there over a period of weeks. In the cholera epidemics of 1832, 1849, and 1868, thousands of immigrant and rural physicians were hired to staff city clinics and hospitals. In the influenza pandemic of 1918, "plague doctors" were simply assigned by the Army. During the AIDS epidemic, dedicated units have been established in hospitals in a number of cities: most of them are staffed by full-time physicians.

The concept of "plague doctors" was also routinized in the twentieth century. Early in this century, public health departments began to hire full and part-time physicians to treat infectious diseases among the poor. More important, treating the diseases of the poor became a responsibility of graduate medical education—of interns and residents—during this century. In many cities and states, it also became a responsibility of medical faculty members, either in state-owned teaching hospitals, or through contracts between medical schools and city hospitals.

Nursing shortages have been reported in most epidemics. Before the era of professional nursing, which began in the late nineteenth century, volunteers and recovering patients staffed hospitals during epidemics. Although physicians have risked acquiring epidemic disease, nurses have been at even greater risk because they spend more time with patients and have more frequent contact with them. In the era of professional nursing, periodic general shortages—a result of labor market conditions beyond the scope of this paper—have been exacerbated by epidemics.

Similarities between Epidemic and Endemic Infectious Disease. Most of the themes in the history of Americans' responses to epidemics also characterize their responses to widespread endemic infectious disease. The difference between responses to endemic and epidemic disease is of intensity, not of kind. The history of public health measures to contain syphilis, tuberculosis, typhus, typhoid, and diphtheria, has many similarities to the history of responses to cholera, yellow fever, smallpox, and influenza; for each of the endemic diseases, there is evidence of underestimation, fear, flight, denial, failure of isolation, civic coalitions to make and coordinate policy, and the enlistment of specially rewarded plague doctors.

This similarity is important because AIDS may resemble syphilis and tuberculosis more than it does polio or influenza. Although AIDS is a pandemic of sudden and unexpected onset, it is unlikely to threaten as many people at one time as the great epidemics of the past did. In 1918–19, for example, well over half a million Americans died as a result of Spanish Flu—more than the total number of deaths in World Wars I and II and the Korean war combined. In New Orleans in 1853, 10% of the population of the city perished in only a few months during an epidemic of yellow fever. By contrast, tuberculosis was a steady, deadly presence, the leading cause of death among adults in the United States, from the 1850s to 1920. Similarly, AIDS may become a constant, frightening presence, a cause of death that begins to rival tuberculosis in the past and the leading chronic degenerative diseases (cancers, cardiovascular disease, diabetes) in the present. This point is not made as a prediction, but rather as a commentary on the history of American responses to infectious disease.

Epidemic Disease Is Expensive. Although AIDS is the first epidemic during which extensive studies of cost have been conducted, Americans have long been aware of the heavy costs of epidemic and endemic infectious disease. Both the direct and indirect costs of these diseases were frequently discussed. The heavy direct costs of epidemics have usually been paid from public and philanthropic budgets and by those patients able to pay. Until the routinization of public health practice in this century, there was no clear distinction between public and philanthropic funding. States and cities appropriated funds to philanthropies; charitable organizations spent money in public institutions. Charity was another instrument of public policy.

The assumption that insurance should pay some of the costs of epidemic disease is also new. The first Blue Cross and private insurance plans for hospitalization, established in the 1930s, specifically excluded contagious diseases. Insurance pioneers assumed that the costs of both epidemic and endemic infection would continue to be paid for from public and philanthropic funds. The expansion of private health insurance, and then Medicare and Medicaid, to pay for infectious disease coincided with the decline of these diseases as both a health problem and a major health care expenditure.

AIDS is the first expensive epidemic infectious disease since we organized our modern medical care payment system. Determining who should pay the costs of treating AIDS is, in historical terms, an unprecedented problem. This problem is not faced by countries that have public or public-private national health systems. Paying the direct cost of AIDS is only a problem in countries in which, as in the United States, everyone is not covered by a single plan or by linked health care plans. The contemporary American dilemma of health care cost shifting is unique and without historical precedent.

History of AIDS. Some readers may wonder why I did not mention a number of major diseases and epidemics. My criterion for inclusion was germaneness to the problems of the AIDS epidemic. Thus I left out childhood diseases—diphtheria, scarlet fever, measles, for instance—because their history was not directly analogous to AIDS. Similarly, I slighted infantile paralysis because the disease and the campaign against it is a unique story.

And I left out the recent experiences with swine flu, Legionnaire's disease, and toxic-shock syndrome because the first was an epidemic that did not occur, and the latter were small-scale, highly successful examples of the application of scientific knowledge to understanding and addressing diseases.

AIDS is different from the diseases I have included here as well as those I have chosen to ignore. The major difference is that we do not know the natural history of AIDS and until we know it, we cannot draw very many lessons from the past about its social history. Until the twentieth century, contemporaries did not know very much about the natural history of the diseases to which they responded. They mobilized in response to threats of unknown magnitude and duration. During this century, in contrast, we have assumed that we know the natural history of the most threatening infectious diseases. With AIDS it is clear that we do not know.

AIDS is, at present, unlike the diseases of the past, each of which ran its course, then departed to return in somewhat different form, or remained an endemic but contained threat. We do not know what the natural history of AIDS will be, we do not know at what rate cases will continue to increase or to decrease. Moreover, we are less than certain about what public policies and individual actions will contribute to a decreasing number of cases. Predictions about the number of AIDS cases in the future are highly speculative.

The most facile generalization from history would be that AIDS will run its course and decline, because all diseases—even the terrible Black Death—eventually did so. Unfortunately, regularities in the history of disease are not nearly as predictable as those in the solar system. A more prudent generalization from history is that changes in the natural history of disease are the result of the interaction of agent, host, and environment. The history of how Americans have responded to epidemics in the past demonstrates that human action can have an impact on the course of disease, but only up to a point. What that point is can be influenced by how a society organizes its responses to epidemics and, more broadly, by how prosperous it is, and how it shares its wealth with people whose poverty makes them most susceptible to infection. But much of the natural history of the disease—the character of the agent and its passage through human society—remains unknown. For AIDS, much more remains to be learned.

Note on Sources

This is not a formal bibliography but rather a guide to the major historical works on the issues addressed in this report. Most of the literature pertinent to this paper can be found in the citations to the essays in Elizabeth Fee and Daniel M. Fox, eds., *AIDS: The Burdens of History* (Berkeley and Los Angeles: University of California Press, 1988). Many of the specific details in this paper are drawn from research published in one of these essays, previously published as Daniel M. Fox, "The Politics of Physicians' Responsibility in Epidemics: A Note on History," *Hastings Center Report*, April–May, 1988. Other essays in this book that bear on this paper include those by Allan M. Brandt on venereal disease,

David Musto on quarantine, Gerald Oppenheimer on the history of the epidemiology of HIV infection, and Guenther B. Risse on polio. In addition, there is much of value about venereal disease in Brandt's *No Magic Bullet* (New York: Oxford University Press, 1985).

The literature on epidemics of contagious diseases in the United States is too vast to be cited in detail here. However, a number of books have become classics in the field. These include George Rosen, *A History of Public Health* (New York: MD Publications, 1958); Charles E. Rosenberg, *The Cholera Years: The United States in 1839, 1849 and 1866* (Chicago: University of Chicago Press, 1966); John Harvey Powell, *Bring Out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793* (New York: Arno Press, 2nd edition, 1970); and Alfred W. Crosby, *Epidemic and Peace, 1918* (Westport, Conn.: Greenwood Press, 1976).

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AIDS: The Challenge to the Press

ERIK ECKHOLM

I suspect that for most of you, *The New York Times* is like an enormous black box that spews out words each day. As deputy science and health editor for the *Times* I would like to give you at least an idea of how we approach reporting of science in general and in particular to focus on our work reporting on AIDS.

The press occupies a prominent and sometimes uncomfortable position in society's response to AIDS. Our job is to report the news, not to proselytize for social causes or even to pursue a deliberate program of public education. But we recognize that, inevitably, the press is the main source of public information about AIDS. And if we do our job right, society's educational needs will be served. We also recognize that what we report, and what we do not, can affect people's lives—giving them information that could induce them to avoid risky behavior, for example, or that can reassure them about the safety of working next to someone with AIDS. Naive reports about an unproved treatment can raise cruel, false hopes, and lead some patients to harm themselves. A good investigation, on the other hand, might prod along a faltering drug trial, perhaps saving lives. So editors and reporters do approach AIDS with a deep sense of responsibility.

At the same time, we should all remember that the press is not omnipotent. This became clear to me a couple of years ago, when parents and school boards in some districts of New York promoted a boycott of their schools because children with AIDS were allowed to attend unidentified schools somewhere in the city. As a reporter, I called one of the boycott leaders, the head of a local board in Queens. "We aren't trying to be unreasonable," he said, "but nobody will answer our questions."

I asked him what sort of questions, and he ticked off a list: Can the virus spread on toilets, can the virus spread on drinking glasses, can the virus spread through a bite, etc. I took down his questions and the next morning the *Times* carried a series of questions and answers on AIDS, including everything he had asked. We gave the best judgments of the nation's leading medical experts on each question, answers that one would expect to be reassuring. Of course, we had reported these things before. And this repetition of the negligible risks from casual transmission didn't seem to have any effect on the boycott.

I'm sure that, over time, incantation of the evidence that AIDS does not spread easily has had a beneficial effect. But that incident showed that people sometimes make up their minds in unpredictable ways, that people don't believe everything they read. If people distrust the government or "experts," then our reporting of expert opinion is not necessarily going to change their minds.

Deciding What to Cover and How. As with other medical and scientific topics, reporting on AIDS demands special expertise, both to understand and explain the news and to make judgments about what is important and what is not. Many nonjournalists are amazed (and a little worried) by the speed with which we work, and are concerned about accuracy when they detect a mistake. But within the newspaper, speed and accuracy are the givens. Deciding what to cover and how are much more difficult challenges.

Not a day goes by without some sort of AIDS-related claim being thrust upon us. A company says its new kind of virus test will revolutionize the screening process. A doctor in Europe announces that some drug has slowed AIDS in three of his patients. A virus expert in California says HIV is not the cause of AIDS. When are

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these stories worth reporting, and in what detail? When is a story newsworthy, is it true, does it advance our understanding or involve an event that is likely to have significant repercussions, or is it just plain interesting? The answer isn't always obvious, and I'm sure we've made mistakes, but it helps to be familiar with the field and to have trusted sources we can call for an opinion.

Today, the sheer number of new reports, conferences, disputes, and other events involving AIDS is nearly overwhelming. This week alone, I know of at least two AIDS conferences here in New York, plus the Presidential Commission met for three days in Washington. There were several AIDS reports in major medical journals. The *Times* probably received a dozen press releases from companies about new AIDS-related products. We can't cover everything, but on an average day the *Times* often carries two or three stories about various aspects of the AIDS epidemic—some on medical issues, some on the social, economic, and legal issues; some local, some national, and some foreign. Today I counted five stories directly about AIDS, and more mentioned it.

One challenge is meeting the highly diverse needs of our readership. Some readers, a significant minority I would guess, are hungry for every detail and are nearly as well informed about AIDS as most doctors. These readers really want to know which HIV protein is being used in a new vaccine candidate, and they want to know about a finding that HIV infects, say, Langerhans cells. At the same time, I sense that we have a steadily widening circle of new readers. As more people are touched by AIDS in some manner in their own lives, or simply realize that it is not going to go away, they start paying attention to articles that formerly they would have tuned out. Those of us who are deeply immersed in the issue have to constantly remind ourselves to step back and retell the whole story. It is crucial constantly to reiterate the basics: how AIDS is and is not transmitted, for example, and what a positive antibody test means. We do try to report in some detail on the frontiers of molecular biology and other more technical aspects of AIDS. But we strive to write even these stories in a way a newcomer to the field can understand and appreciate.

Giving Perspective on the Facts. With such a constant barrage of new data and events, perhaps the greatest challenge is to help people make sense of things—to put the day's new facts into perspective. Over the course of several months, for example, we may print dozens of stories on progress or setbacks involving one or another experimental drug or vaccine. We may describe, as they appear, many different studies finding greater or lesser risks of heterosexual transmission.

Not surprisingly, despite the abundance of things to read—or perhaps because of it—many people wind up feeling confused. We try to overcome this in various ways. First of all, the editors try to insure that every story, even the three-inch wire service report on an event in Cleveland, contains a sentence or paragraph that explains its significance. Stories without interpretation can be misleading. It means one thing to say that a Baltimore clinic found a surprisingly high percentage of people without identified risk factors to be infected with HIV. It means something different when you go on to note that the people had only been given a written questionnaire and had not been rigorously questioned in person about their sexual and drug histories, and that in other cities when such questioning had been carried out most of the people turned out to have traditional risk factors after all.

In addition, from time to time we step back and conduct major assessments of a topic. Recently, for example, the *Times* carried a series intended to review the course of the epidemic, the progress in drug and vaccine trials, and social responses. The first article reviewed the epidemiology, digesting the results of hundreds of small studies and interviews. This highlighted some basic trends that may have been lost to many readers in the blitz of daily stories: that, although the spread of the virus appears to be abating, we've only just begun to experience the toll of disease and death, and that new infections today appear to be centered on the intravenous-drug world.

"Sensationalism" in Science Journalism. Often scientists accuse the press of sensationalizing, of blowing minor stories out of proportion or of emphasizing the most lurid aspects of a story. No doubt this sometimes happens, although critics tend to generalize on the basis of what a few openly lurid papers do. As an editor, I spend nearly as much time toning down, if not shooting down, AIDS stories as I do putting them into the paper.

We cannot hide stories that are of wide interest, even when the news is unpleasant. When the first reports came in of people who had been infected by transfusions after the advent of screening, for example, I certainly worried that this would be misconstrued and cause panic. But trying to stifle such news would only breed rumors and paranoia. What we did was to explain as clearly as we could how low the risk now was, especially in the context of life-threatening situations requiring transfusions.

Scientists who are accustomed to hedging every statement sometimes resent it when journalists ask them to make a bold statement for the record. If a science story seems worth reporting, we try to get, from the authors or other experts, the strongest possible statement that is justified: something like "this shows conclusively that this causes that." Newspaper readers want to know immediately why they are reading an article; otherwise we lose them. But if the picture is really clouded, or the evidence is inconclusive, that's what we'll say. Sometimes the uncertainty itself is the story.

In describing some important aspects of the AIDS epidemic, complex, subtle, even ambiguous messages have been unavoidable. The threat to the heterosexual population at large is a good example. For some time now we have reported with confidence that the AIDS virus can clearly spread through heterosexual intercourse. We also know that the virus is spreading among the sexual partners of drug addicts, especially among inner-city minorities. We can tell the public that the threat is real, that in certain circumstances the threat is high, and explain why officials have launched campaigns encouraging condom use. At the same time, we must report that there is no evidence so far of any large-scale spread of the virus among heterosexuals not on the fringe of the intravenous-drug world.

Even more sensitive is describing who in our society is most threatened by AIDS. Gay men and, increasingly, poor minorities are the main victims, and all signs are that they will continue to be. From the beginning of the epidemic, a problem has been the tendency of many people to regard AIDS as something that afflicted "them"—seemingly remote members of "risk groups." I think this has gradually subsided, especially as fears of heterosexual spread became rampant.

Now, with rising evidence that the AIDS problem of the future will be more and more a problem of inner-city minorities, will society again turn away? I hope not and think not. Despite some obvious missteps, American society has not taken the draconian measures toward AIDS patients that many had feared. And support seems high for increased funding of research and education. Armed with the facts, perhaps a well informed public will, after all, follow humane and sensible policies on AIDS.

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AIDS: Epidemiology and Treatment Issues

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AIDS presents many ethical challenges to the medical community. The practitioner's interaction with the patient involves the ethical issues of informed consent, the duty to warn, and confidentiality, among others. The moral dimension of the practitioner's role involves the issues of the duty to treat, homophobia, fear of contagion. Economic considerations enter the ethical arena in the use of costly medical services, intensive care units, acute care beds for the terminally ill, elective surgery, for example.

This paper will discuss AIDS epidemiology and costs, particularly in New York City; the question of whether to use acute-care hospital beds or alternative organizational methods—cluster versus scatter beds; and the challenges confronting medical researchers in gathering the data necessary for making the decisions that must be made.

AIDS Epidemiology and Costs

Since the first reports in 1981, one from this institution (1), of what is now known to be AIDS, the number of cases has risen dramatically. As of March 1, 1989, there were over 87,000 reported cases of AIDS and 49,800 deaths in the United States (2). What were initially reported as rare cases in New York, Los Angeles, and San Francisco have become an epidemic affecting every state in this country and nearly every country in the world.

AIDS ranks near the top of the list of major impairments in terms of average lifetime medical costs—$70,000 to $115,000 (3, 4). It is estimated that AIDS will account for about 1% of total national spending on health and about 3% of Medicaid program costs (5). The Centers for Disease Control estimate that over one-third of all AIDS cases reported in the United States have been in New York City (2).

Studies project that the annual costs for treating AIDS patients in New York City will reach $2.9 billion. This reflects only inpatient hospital care, which constitutes the bulk of AIDS-related costs in the City. The AIDS inpatient census, according to one estimate, could reach 5,150 per day by 1991, including 2,000 in municipal hospitals. Twenty-two percent of the actual caseload is in the hospital at any one time; hospital costs, which in 1988 were $800 per day, have been projected to be $1,529 by 1991. A large proportion of these hospital costs falls on Medicaid (6). The Greater New York Hospital Association is working with the New York State Department of Health Systems Management to determine the appropriate rate of hospital reimbursement for AIDS patients (7). By 1986, six cost centers had undergone significant social changes in order to treat AIDS patients, increasing their daily total costs by $171 per patient (7). The St. Luke's-Roosevelt Study (New York City) on resource utilization by AIDS patients in the acute care hospital described enhanced needs for nursing, primary physicians, social work, and medical consultants; 19% received psychiatric consultation (8). Quantitative medical and nursing care of AIDS patients surpasses, even doubles, that received by comparable medical-surgical inpatients, and AIDS patients have distinctly different health care needs at predictable stages of illness, suggesting that traditional staffing patterns may not provide effective care to inpatients (8).

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Specialized Cluster Beds vs Scatter Beds

San Francisco General Hospital pioneered in developing model institutional health care delivery for patients with AIDS (9). In 1983, they established an AIDS outpatient clinic, and later opened a specialized AIDS inpatient unit. This unit developed working relationships with a number of volunteer and community organizations and has become a prototype for other such units throughout the country. However, the San Francisco General Hospital model of AIDS inpatient care may not be applicable to different populations (9). In San Francisco, more than 95% of AIDS cases to date have been in homosexual men, many of whom are well-educated professionals. There is also a history of gay activism in San Francisco, were homosexuals are a well-organized and politically powerful force. In New York, more than half of the AIDS patients are intravenous drug abusers (IVDA), usually in the lower strata of the socioeconomic scale, whose illness is frequently complicated by additional problems, including a sense of alienation and disenfranchisement.

The New York State Department of Health, Office of Health Systems Management estimates that by 1990, 14,700 AIDS hospital admissions in New York City will fill 4.4% of the total beds and account for nearly 400,000 inpatient days. This estimate of an enormous need for hospital beds and the question of how they should be organized is reminiscent of the questions that arose in 1950 over the potential number of coronary patients and whether there should be specialized coronary care units for them. Scattered reports itemized apparent benefits from such specialized units, and they rapidly came to be considered the standard of care, although no scientific study of their efficacy was made (10). It is instructive to compare the situation in this country, in which every hospital has a coronary care unit with expensive monitoring equipment, to that in England, where recent studies have shown that a portion of patients with uncomplicated myocardial infarctions can do just as well in less intensive settings, including the home (11). Before the window of opportunity closes, it is crucial to collect data comparing the clinical, psychosocial, and economic costs and benefits of AIDS cluster units with those of scatter-bed treatment.

The President's Commission on the Human Immunodeficiency Virus Epidemic specifies the need to acquire data on cluster versus scatter beds as a high priority of health services delivery research (12), "in order to compare their effectiveness with respect to cost and quality of care, patient satisfaction, and the effect on staff (e.g., on recruitment, retention, turnover rate, and satisfaction)."

Among the claimed advantages of cluster-unit health care delivery are

- The fostering of a milieu that more efficiently addresses the psychosocial needs of patients and staff. Psychiatric patients in general hospital scatter beds have been reported to be undertreated in comparison to those in specialized psychiatric cluster units (13). Staff also can be better supported to reduce their stress and burnout from providing services to severely ill and dying patients.
- The presence of a dedicated staff that can become more knowledgeable about the special problems of patients with AIDS.
- The ability to conduct patient education, social service programs, patient and "significant-other" self-help, and therapist-led groups to reduce the stress of hospitalization and coping with AIDS.
- The technical advantages typically incorporated into specialty units of all sorts.

On the other hand, proponents of scatter-bed treatment for AIDS patients are concerned about the disadvantages of cluster units: loss of confidentiality, stigmatization of patients by isolating them in a "leper colony" setting, the difficulty of hiring and retaining nursing staff on AIDS units, resistance to serve from house staff, and a fear that reimbursement formulas do not adequately cover expected increases in costs.

Scant information exists on the extra cost for dedicated AIDS units: additional nurses, social workers, attendants, consultants, etc. Preliminary studies at The Mount Sinai Hospital (NYC) indicate that patients' length of stay is one-third longer in dedicated cluster beds (21.9 ± 18.0 days, versus 14.7 ± 12.8 days, $p < .05$), with increased charges ($9,423 ± $7,748, versus $6,493 ± $5,411), without evidence of increased benefits. New York State is buttressing state-designated AIDS treatment units with requirements for supplemental social service and nursing staff and is providing reimbursement incentives to accommodate extra staffing up to 135% of the current and applicable per diem rates.

Although the National Center for Health Services Research reports that AIDS patients may cost less than originally estimated, partly as a result of decreased hospital length of stay regardless of payment source (14), the question remains whether designated units entail not only differential costs and outpatient substitution effects, but also increased patient satisfaction, less staff stress, and enhanced detection and treatment of psychosocial and behavioral morbidity (12).

Reimbursement. Studying the treatment modalities under development for AIDS patients in New York State (NYS) will provide nationally relevant information on the implications of the two major models of reimbursement-driven policy options: reimbursing hospitals for all AIDS patients by an enhanced DRG set of payments, versus enhancing reimbursement to hospitals only for AIDS patients treated in a designated AIDS unit that has met stringent standards. In NYS now (and in other states in the future), these two approaches are being actively debated. Many hospitals in New York City have AIDS units designated by the New York State Department of Health (DOH) as complying with resource standards of staff intensity and facilities. In addition, these hospitals continue to treat some AIDS patients in scatter beds. Mount Sinai also has both a cluster unit (which is similar in nature to those in other hospitals, although not state-designated) and general scatter beds. Hospital administrators have debated whether enhanced DRGs are to be preferred to the enhanced per diem reimbursement system for cluster patients before deciding whether to apply for an AIDS-designated unit. On January 1, 1988, New York State introduced special DRGs that rate AIDS patients' cases by severity, whether or not the patient was treated in a specialized cluster unit, and whether or not the treating hospital does in fact have such a unit.

Indeed, it is the general view within the industry that the capital and income requirements for complying with the standards of cluster-unit designation are so great as to make that choice fiscally unattractive when compared with DRG-based reimbursement, which disregards type of bed, for AIDS patients. In recognition of the hospital attitude and their own position that designated AIDS units are the preferred policy option, NYS DOH has recently circulated proposed revisions of the AIDS DRG weights that would substantially reduce, if not remove, the present incentive favoring DRG reimbursement; the case-intensity weights will be lowered, and revenue enhancement for unit designation will probably be increased. These issues will need to be addressed by other states and administrators at the federal Health Cost Finance Administration.

Data Gathering

Classification by Complications or by Staging. To learn more about the appropriateness of alternative social and medical treatment policies requires collecting unusually large amounts of data. The variety of initial symptoms and complicating infections in AIDS patients creates a case mix that confounds outcome studies in general and AIDS research in particular. The CDC's widely used classificatory system groups AIDS patients into four categories: (a) Kaposi's sarcoma (KS), (b) *Pneumocystis carinii* pneumonia (PCP), (c) KS and PCP, and (d) all other conditions. It is a crude sorting tool and fails to take note of important distinctions between patients with many common AIDS complications. For example, among hospitalized patients in New York in 1985, 40% suffered from infections other than PCP, and these conditions clearly affected mortality rates (15). This additional 40% is simply lumped in category d of the CDC classification. Thus the CDC surveillance definition is inadequate for a case-mix classification, because it emphasizes only manifestations of the disease that are useful for surveillance purposes and does not account for relative severity (16).

The Walter Reed system generates clinical and laboratory data which is not otherwise available for hospitalized AIDS patients (17). It groups patients with AIDS into three stages, rather than focussing on complications, since the purpose of the system is to stage the whole spectrum of HIV infection. The classification proposed by Feinstein and colleagues, using several pathophysiologic combinations to group patients, omits the consequences of statistically managing a large variety of infections which afflict AIDS patients (17A). Consequently, the AIDS Staging Classification for AIDS hospitalization developed under National Center for Health Services Research auspices by Turner et al. (16) may ultimately become, if validated, the research standard. It focuses specifically on AIDS, incorporates common complications not included in the CDC definition (18), and is based on data readily available for all AIDS patients.

Psychiatric Morbidity. Another important measure of case mix is psychiatric morbidity. Medical and psychiatric disorders frequently occur simultaneously. Epidemiologic studies report that 30%–60% (19) of medical inpatients have a concurrent psychiatric disorder (psychiatric comorbidity). The number of medical symptoms is an important predictor of psychiatric symptomatology, and vice versa (10). Patients with psychiatric and medical comorbidity have increased mortality rates (20–22) and inpatient medical resource utilization (23–24).

AIDS patients are known to have major psychiatric symptoms (25, 26). The cognitive component is so apparent that the diagnosis of AIDS has been expanded to include dementia per se—AIDS dementia. Depressive disorders, anxiety reactions, organic mental syndromes, and adjustment disorders are ubiquitous among AIDS patients. Many of the chemotherapeutic agents used to treat the opportunistic infections and Kaposi's sarcoma—the antiviral and antineoplastic medications—may have central nervous system effects that can produce major psychiatric syndromes, including delusions, hallucinations, confusion, depression anxiety, insomnia, anorexia, decreased libido, and anhedonia. The diagnostic dilemma of whether the psychiatric morbidity is a result of the virus on the brain, or a psychological reaction to having AIDS, or the effects of chemotherapy, or a combination of all three presents difficulties for sorting data on assessment and treatment.

Obviously there is a need to overcome these problems of isolating, collecting, and classifying data. Informed choices on treatment and health policy cannot be made without this information. This need may bring into conflict the physician's desire to individualize patient care and his or her responsibility to act for the public good in times of epidemic disease.

Conclusion. The magnitude of the AIDS epidemic will demand difficult choices to be made by patients, by those who deliver health care, by administrators, and by makers of social policy. It is imperative that these choices be based on the best data available and that studies be undertaken to enhance our knowledge. When decisions are made regarding patient care, professional responsibility, or social policy, the decision-making process must reflect critical thinking about the complex issues. The tools for critical and judicious deliberation are at hand, even if the answers to this catastrophic epidemic are elusive.

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AIDS: The State of the New York State Approach

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The public health seems to gain our attention only in a crisis, and we seem to move from one crisis to another. For public servants, the relative importance of each of the slate of problems we confront changes as we fulfill one responsibility or another, and go on to deal with others as part of our accountability for assuring conditions necessary for people to be healthy.

Right now we have an immediate crisis in the AIDS epidemic. We also have a variety of enduring problems, such as chronic illness and societal conditions that cause injury. We are also faced with impending non-AIDS-related crises, such as future difficulties from environmental disasters. Our inability to define the future extent of the AIDS crisis means that we are dealing with an immediate and potentially enduring crisis whose precise magnitude we do not yet know.

AIDS as a Broad Social Challenge, Not Just a Public Health Challenge. Difficulties in public health often reflect societal difficulties; they are not simply and discretely problems of health, and to confront them we need a broad social perspective.

Within the spectrum of public health crises, we must attempt to define the programs we will develop to limit the further spread of AIDS infection, and our responses to those individuals already infected. The ultimate government response must consider the options we have for the provision of care and all the issues associated with the way we provide care, the allocations of resources that are to be made, the way in which we make decisions with respect to those allocations, and how problems in treating AIDS are going to impact on the rest of the health care system.

But as in all the problems of public health, when we address the problems of AIDS, we require a societal perspective that enables us to look at the whole fabric within which AIDS has emerged. AIDS is a challenge to our society, and not simply a challenge to public health. The difficulties we currently face with respect to some of the populations that appear to be most at risk relate to difficulties these same populations have had for a long time, difficulties rooted in a variety of socioeconomic factors and highlighted by the AIDS epidemic. The behavioral factors involved are as much a part of the crisis as is public health per se. If we are to be effective in our response we cannot focus exclusively on health issues, but must address questions previously overlooked.

Many of us in public health and related areas have never taken seriously enough the impact of social sciences and, consequently, we have done little to support them. However, we are beginning to recognize that what we are facing today in the AIDS crisis is the task of the formulation of behavior, as well as the motivation for individuals to change their behavior. We have had some success in behavior modification, but not much in behavior formulation. The successes have come from within social groups, not necessarily as a result of the influences of public health officials. Certainly the response of public health officials has helped develop a greater emphasis on education, counseling, and those traditional elements of public health we have learned to rely on in the absence of a magic bullet—a cure for AIDS, or a vaccine to prevent infection by the presumedly responsible virus.

Statistics and Uncertainty. We also have to recognize great uncertainty about what it is we are addressing. We must be honest with respect

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to that uncertainty, and this in itself is an ethical dilemma for some of us. If we are to be absolutely honest, we must recognize that we have as many questions as there are answers. We seem to be able to respond glibly to some of the threats: statements suggesting that the existing AIDS epidemic is confined to certain populations, projections on whether it will affect the heterosexual population. All such claims are based on a variety of assumptions. All contain uncertainties that only time will resolve.

Beyond uncertainties about the illness, what we do today will affect the way the epidemic progresses in our society. Epidemics generally are defined in terms of various subpopulations that are differently affected by the infection. What we have tended to focus on are two or three smaller subpopulations within our society, specifically the homosexual population, the intravenous-drug-abusing population, and the consorts or collaterals of that population that may provide an avenue of spread into the heterosexual community. But we know so little about the rate of infection among different groups that we really cannot predict with any accuracy what is going to happen.

Given the level of uncertainty, the ethical issues become extraordinary. What kinds of information ought we to provide, to whom, and under what circumstances? What kind of assurances do we offer the general public about our blood supply? What do we say to someone who asks about the likelihood that he or she might become infected as the result of a blood transfusion?

We can speak in terms of statistics. We can speak in terms of the certainties that we are finding by testing for antibodies. We can speak of the relative levels of antibody currently in the blood supply. What is the responsibility of the physician to his or her patient for making certain that the person recognizes that, however small the likelihood, there is some potential for the transmission of the AIDS virus that has so far gone undetected by existing methodologies?

What are we going to tell expectant mothers exposed to the virus by a mate who may have been bisexual or an intravenous drug abuser? If her own blood test is positive, what are we to tell her about the child? What are we to tell her about the options available to her? Do we indeed know all the facts on transmission?

Unfortunately, the levels of uncertainty associated with these questions are far higher than the certainties. Our responses have been based on assumptions that in turn have been based upon relatively small samples of affected populations. For example, we know from our recent testing of all infants born in the State of New York that some things do not add up. As a result of our extensive testing of over 50,000 newborns, we have determined that it is likely that over 2,000 babies will be born to currently seropositive mothers. Of these 2,000, how many will be seropositive? The projection has been 30% to 50%. What percentage of that population is going to contract AIDS? As we counsel potential mothers, we are going to give them some of these statistics that have a major impact on their reproductive decisions. Yet their decisions will clearly be based on inadequate information. We are dealing with people's reproductive lives, with future generations. But we lack the kind of definitive information that would enable individuals to make the informed judgments they ideally should be able to make about their future and their potential offspring's future.

Several findings do, however, give us pause. One is that the number of infants diagnosed with AIDS in this state is of the order of 275 or 280 in total. Yet we are projecting, from the information we have accumulated over the past several months, that as many as 2,000 newborns will be at great risk for AIDS, of whom a large percentage will eventually come down with AIDS. There is something wrong with the data, some misestimates, either of the number of children currently seropositive, or the number who will become seropositive, or the number who will have AIDS. We have many questions with respect to co-factors associated with the development of overt AIDS in persons who are HIV positive.

So we are making public health policy in the absence of definitive information. Without full knowledge to guide us, we are making recommendations designed to protect the public and stem the spread of the disease, addressing the problems associated with treatment, and engaging in research aimed at the development of vaccines.

Socially Deprived Subpopulations and AIDS. In New York State the epidemic is increasingly an epidemic in the intravenous-drug-abusing population. This population is not a new phenomenon in New York; its members have been dying of hepatitis B and a variety of diseases for a long time. We are now beginning to focus on this population because of the threat they pose to the general population by spreading AIDS, not just hepatitis B or other diseases.

We have to ask ourselves why it has taken the AIDS pandemic and the threat to the heterosexual population to direct us to the socioeconomic needs and characteristics of populations that have so long been deprived. As we deal with the problems of AIDS and its spread, we need to confront a series of social, economic, and ethical questions that transcend the problems of infection with the HIV virus alone.

Socioeconomic circumstances have encouraged the transmission of AIDS, as well as hepatitis B and other infections that have been the scourge of this population. What we are now recognizing, at long last, is that we have a responsibility to this population. Indicative of the change is the recent statement by Admiral Watkins, chairman of the Presidential Commission on AIDS, focussing on the need for the federal government to provide treatment on demand to our large group of intravenous-drug-abusing individuals—that is, focussing on the underlying issues associated with the transmission of AIDS, on the ethical question. How are we to reweave the whole social fabric to effectively address the problems of the transmission of HIV? Government at every level needs to provide for compassionate care and the identification and development of drugs to treat addicts. We all need to recognize and deal with the basic problems in our society to interdict transmission.

Access to Treatment Agents for the Asymptomatic. Ethical questions also arise on the availability of not yet adequately tested drugs for infected but asymptomatic individuals. Along with our compassion, we also have to make certain we do them no harm. Some treatment plans suggest providing toxic materials to asymptomatic patients. Do we really know enough about those who are asymptomatic and the factors that lead to the transition from seropositivity to AIDS to use a host of such potentially toxic drugs? What about scientific assurance that a drug will be beneficial? For individuals who have little to look forward to, the use of compassionate drugs is unquestioned. However, for the asymptomatic, what decision should we make with respect to distribution of drugs? It is not simply a question of cost but a question of our scientific credibility, of our ethical responsibility in forging public policy.

Allocating Health Resources for Drug Abusers and the Doomed. As a society we are also faced with an enormous problem with respect to the allocation of resources. Some have argued for a reduction in the allocation of resources to individuals who are ultimately doomed. There is concern about the impact of AIDS treatment on the availability of medical resources for the rest of the population. We have not yet reached an overt system of rationing, but such decisions have been suggested with respect to individuals with AIDS. There have been suggestions that these persons should be dealt with differently because of the population they represent. Public policy in New York State has not permitted this kind of distinction to be made. We are determined that all patients who are afflicted with the disease will receive the same level of care as other patients. At the same time, we must recognize fears within our society about the availability of care.

Risks to Health Care Providers. Health care providers, at virtually every level, have raised questions about their own risk in caring for patients who might transmit the disease through body fluids. The potential is certainly there. The eventuality is remote as long as appropriate precautions, standard for preventing the transmission of infectious disease, are taken. We have advocated that the same precautions be taken with patients not known or suspected of being seropositive and with those who are known to have AIDS.

Testing and Individual Rights. Physicians have raised questions about the desirability of testing many individual patients. I have asked whether patients should require the same information from the treating physician. After all, because of the physician's exposure, is not the physician at greater risk for being HIV positive than the individual patient? Should the physician be tested weekly? Monthly? Daily? Between patients?

I am not being facetious, but I think one has to understand the kinds of questions that ought to be addressed when dealing with the issue of testing. Who are we testing, and do we really know why we are testing? There are public health reasons for testing; the blood supply should be tested to stop the spread of the disease. However, the reasons for testing individuals have generally related to education and counseling. It is as important to counsel someone who has sought a test and tests negative as to counsel someone who tests positive. It is important because we are attempting to modify behavior to deal with the spread of the disease. We are not going to deal with it in the immediate future with drugs or a vaccine, but rather through public health initiatives of education and counseling. Testing itself is only a small component of this process.

We have had a great many questions about who should know the results of HIV testing; I am not here to tell you the answer. Rather, I would emphasize that when the question is raised, you ask carefully why an individual should know, and what right that individual has to the information. There are reasons for individuals to know these test results, but the reasons have to be delimited as a matter of public policy, so that the discriminatory practices that have characterized the way we have dealt with some of these subpopulations in the past are not strengthened by this new scourge. We should be very careful of the way in which we impose limitations on individual rights.

I am not suggesting that individual rights take precedence over our communal responsibility for public health. Ultimately we are going to have to exercise that communal responsibility, but how the communal exercise is carried out is important. I think it can be carried out without infringing on individual rights, without depriving individuals of their privacy, without imposing new burdens, such as loss of housing or of jobs, which have characterized some people's responses to the AIDS epidemic.

One positive note: in spite of the problems we have confronted, I believe we have responded well. There is no panic. There is concern, legitimate concern. By and large, the population of the State of New York has become educated. It has made a measured response to the problems of AIDS. With all the problems, and with all the denials of care, there has nevertheless been a recognition of our responsibilities as a society to deal with the problems of AIDS in a compassionate fashion. We have a long way to go. In our projection we are not looking at 1991, 1992, or 1995, but at the years 2000, 2005, and 2010. We do not know how many of the children born today will carry the virus and potentially transmit it. We do know there is the potential for transmission into the general heterosexual community, but we do not know whether that will occur. It will occur if we do not continue the kind of education on behavioral practices that have so far kept it from becoming part of the heterosexual community. We must provide information at every level of our society to those who are most at risk, in a form that they can understand, so that "safe sex" and safe drug use will be practiced. Whether needles are distributed is irrelevant. What is important is that people be counseled and educated on the dangers of communal use of needles.

We confront an enormous threat that can only be addressed by responsible action at every level of government, at every level of our society. It is going to require resources; compassion; renewed effort; behavior modification and behavior formulation; scientific investment; new research. Above all, it is going to require a social ethic that transcends anything we have experienced. Public health will remain in crisis for a long time to come. The crisis will continue to be AIDS because the threat remains great. Unless we continue the kinds of surveillance and activities in which we are currently engaged, the worst predictions may come to pass. One should not take too great solace that the percentage of heterosexual cases has remained relatively constant. The threat remains. There is no vaccine on the horizon and there are serious questions about the possibility of developing a vaccine.

The National Academy of Sciences has indicated the many kinds of technical difficulties being confronted by researchers. Do not look for an immediate cure. Do not look for an immediately available vaccine. Look to yourselves—look to society—for the definition of the parameters within which we are going to deal with the prevention and the eradication of this disease.

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The Ethics of Pandemics

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War, famine, pestilence, benign from a distance, strike terror in us the closer we are to them. From a distance we preach peace and believe mostly that wars arise from our talent for stupidity and cupidity. It rarely occurs to us that wars are unavoidable, much less desirable. On the other hand, we think famine, real famine, not malnourishment, is avoidable. We tend to believe that famine is just a mere matter of maldistribution, or perhaps that coupled with a reluctance to share excessive waste in food-rich nations. I have rarely heard it said that famines are unavoidable, even if Malthus said they are, and never that they are desirable. But pestilence, we are convinced, is unavoidable, it is certainly unwanted, and we are willing to marshall vast resources to fend it off because we recognize it as beyond choice. Just as we have articulated a set of rules for war (to pursue it, to live with it, to humanize its inhumanity), we have rules for famine (who gets what from whom) and for pestilence. The first rule of pestilence is *avoid contagion,* the second is *contain it.* The first response of the rational agent faced with an epidemic of a felling disease is to flee from it (as Boccaccio reports in the introduction to the *Decameron*), or to lock it out by closing the city gates. Before the advent of the "wonder drugs" of the 1940s it was expected that those who could flee a city infected by a contagious disease would, and that anyone who had the disease would be shunned by all except perhaps their family and their physician.

Barbara Tuchman in *A Distant Mirror* reports about the Black Death of 1347/48 that

> a chronicler of Siena . . . recorded the fear of contagion that froze every other instinct. "Father abandoned child, wife husband, one brother another . . . for this plague seemed to strike through the breath and sight. And so they died. And no one could be found to bury the dead for money or friendship . . . and I, Agnolo di Tura . . . buried my five children with my own hands, and so did many others likewise." And from Boccaccio in the *Decameron:* "One man shunned another . . . kinsfolk held aloof, brother was forsaken by brother, oftentimes husband by wife; nay, what is more, and scarcely to be believed, fathers and mothers were found to abandon their own children to their fate, untended, unvisited as if they had been strangers." And from the Pope's physician, . . . "Charity was dead." (pp. 96–97)

The reported mortality of the plague ranged from a third to a half; some towns were actually obliterated from the maps of Europe. Suppose AIDS were, as some originally feared, an easily transmitted disease, nearly always fatal. Certainly New York City and San Francisco would be ghost towns unless residents had been gated in to start with or gated out of other communities and had to return to take their chances with death on home-town streets. Quoting again from *A Distant Mirror:*

> Stern measures of quarantine were ordered by many cities. As soon as Pisa and Lucca were afflicted, their neighbor Pistoia forbade any of its citizens who might be visiting or doing business in the stricken cities to return home, and likewise forbade the importation of wool and linen. The Doge and Council of Venice ordered burial on the islands to a depth of at least five feet and organized a barge service to transport the corpses. Poland established a quarantine at its frontiers which succeeded in giving it relative immunity. Draconian means were adopted by the despot of Milan, Archbishop Giovanni Visconti, head of the most uninhibited ruling family of the 14th century. He ordered that the first three houses in which the plague was discovered were to be walled up with their occupants inside, enclosing the well, the sick, and the dead in a common tomb. Whether or not owing to his promptitude, Milan escaped lightly in the roll of the dead. With something of the Visconti temperament, a manorial autocrat of Leicestershire burned and razed the village of Noseley when the plague appeared there, to prevent its spread to the manor house. He evidently succeeded, for his direct descendants still inhabit Noseley Hall. (p. 108)

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Avoidance. Reasonable people, increasingly conscious of the effects and transmission of this disease, our plague, have adopted, and urged others to adopt, relevant avoidance techniques, but the hysteria that leads to containment controls has not yet taken hold of the public mind. I think this has largely to do with the flood of information the public has been bombarded with, focussing on sexual and drug abuse transmission, which gives the appearance that avoidance techniques are sufficient to prevent personal danger. No one, it appears, need be at risk if they adopt the relevant avoidance behavior.

The primary exception to this appearance of safety is in the medical community itself, where reasonable people engage in avoidance behavior and simultaneously put themselves at risk because of the nature of their trade. As the number of long-term-care AIDS cases increases, the number of people at risk and the amount of time each will be at risk will necessarily increase.

The pandemic character of this disease and its chronicity is analogous to our experience with tuberculosis in the last century, and is likely to have the same result in shifting social resources to its care. That is, a kind of benign voluntary containment industry will develop, engaged in ministering to the afflicted whose futures are largely hopeless. The number of cases now at hand has already transformed what was an oversupply of medical care facilities to a shortage; soon enough, specialized facilities will have to be made available. In France, by national policy, psychiatric facilities are being converted to AIDS facilities and psychiatric patients are being returned to their hometowns (200 such conversions as of January 1988). The really open question is the staffing of such facilities—encouraging people to put themselves at risk when they need not do so.

The recent AMA diktat that makes refusing to treat an AIDS patient unacceptable, unprofessional conduct for a physician, intern, or medical student is one important step toward solving the care problem. The efficacy of this order hinges on the fortuitous fact that the disease appears to be not easily transmitted and on the fact that the sanctions threatened are severe, in some cases irreversible, and in major care facilities easily enforceable. Were it to become airborn (as Joshua Lederberg hypothesized at the New York Plague Conference in mid-January 1988), as the plague was, then the pressure to adopt the ethics of containment over the ethics of avoidance would be irresistible.

I do not think such an order requiring physicians to treat would have been successful in the time of the Black Plague. Only the self-imposed duty to care would have been effective and then only, I think, if the physician thought that what he could do mattered. Tuchman reports that 20 of the 24 physicians of Venice perished in the plague, and of course they could do nothing, since they had no idea what caused it, nor what medical measures could be taken to cure it. Even now what counts heavily in the type of care given is the extent to which the care is perceived as genuinely improving the patient's prospects. It seems to me quite wrong to mandate surgical intervention on a terminally ill patient when such care puts the surgical team at risk, and there is no reasonable prospect that the surgery will alter the normal course of the disease. Much of the care we can anticipate will be custodial and psychological, and for such care we need the sanatoria of the 19th century, not the teaching hospital of the present age.

Containment. But sanatoria will not contain the disease, since it is spread from apparently healthy individuals. Indeed, a major moral casuality of this pandemic—in addition to the erosion of the normal mutual aid that we usually expect—is mutual trust. Everyone needs to be perceived as a possible carrier. That is a requirement of avoidance behavior. But effective avoidance requires shunning chancy relationships and perceiving possible objects of affection and intimacy as dangerous. Effective avoidance extorts a heavy psychological price in increased self-conscious management of one's actions, and in so doing turns us away from the fruits of romanticism which finally fully flowered only in the past half century.

Only effective containment would restore the general conditions of mutual aid and trust that human relationships thrive on, but effective containment would require the discovery and isolation of carriers. Cuba is now reported to have adopted such a policy; AIDS carriers are being separated from the population and interned in camps. Such a policy turns on early detection of those infected—threatening recognized rights of privacy, informed consent, and confidentiality; the ultimate outcome is the deprivation of established liberties of movement and association for infected persons. Our society does not yet see itself seriously commencing a policy of containment. Here and there mandatory testing has been called for and occasionally introduced in a limited way. The social fabric has not yet been sundered; the moral recognition of rights and liberties, including the right to medical care, has not been eroded significantly. That fact, while all to the good, rests almost entirely on the public belief that avoidance policies will work, and that those who gets AIDS have only themselves to blame. So long as the social perception is that AIDS is the result of avoidable choices, the public sympathy protects the infected from the ethics of containment. If a significant portion of the population were hemophiliacs who had contracted AIDS unavoidably, that sympathy would likely long have passed by.

A Successful Ethics of Avoidance. What must be recognized is that the ethics of avoidance and the ethics of containment are different and require a different perception of the role of physicians and other responsible parties, perhaps most importantly journalists and politicians. The ethics of containment requires fundamental changes in existing political and moral rights. With containment we have the models of leper colonies and our treatment of Typhoid Mary. The ethics of avoidance too has its social price—it requires wide dissemination of objectionable information and radical revision of personal behavior. All of this can be done without sacrifice of either well-recognized rights or liberties, but only with a level of voluntary compliance that it is unrealistic to expect. Moral behavior between self-interested individuals is not as commonplace as we would like to think. People respond to fear, but not always immediately and not always entirely. If they did respond immediately and wholly, there would be few junkies, smokers, alcoholics, and people with high cholesterol counts. The ethics of avoidance requires that nearly everyone respond to its call with a constant vigilance for at least their own good. The real question, then, is how to bring about this constant vigilance in entire populations.

- First, there should be wide dissemination of what we know of the disease, its transmission, and its prevention, in all schools, particularly grade schools. The information is at least as important as any other we impart, and probably more important than most of it.
- Second, the press should keep the society constantly informed, even at the risk of some hysteria. It would be inexcusable to suppress information that could prevent someone from getting infected. To this end I suggest something like an AIDS Watch, a short item, including increasing numbers, and deaths, in the press every day, as readily available as weather data, foreign exchange rates, and box scores. Only if the data are given constant prominence can we convince people that their lives are in their own control, and that their own choices put them at risk. A similar device should be developed for television, since a significant portion of the population does not read newspapers at all, and many who do, do so sporadically or sketchily.
- Third, the AMA and the various branches of government should undertake a joint effort to reach those most at risk with effective recommendations for prevention; this includes free needles (gladly given) and free condoms, as well as direct counseling.

Neither the lack of originality nor the limited array of options should surprise us. Enough intelligence has been focussed on this problem that the options are entirely clear, as are the relevant costs.

The ethics of avoidance fundamentally turns on wide distribution of information. In the AIDS epidemic we are out to change behavior without revelation and without force. We are looking for the effects of religious conversion without religion. The cost of failure will be a social turn to the ethics of containment, and with it the transformation of our culture into one in which the most important civil liberties will be sharply curtailed.

The Cost of Ethics of Containment. The ethics of containment has no natural limit; its object is the eradication of the disease. We would have to expect quarantines, isolation, internments, perhaps even hysteria akin to that of the flagellants of the 14th century. That rage to contain turned into a frenzy of destruction and scapegoat murder that swept Europe (destroying the Jewish populations of most of the towns of Germany as well as other places) and did nothing to contain or prevent the spread of the disease.

With AIDS the ethics of containment starts with involuntary testing. Such an involuntary medical procedure changes the doctor-patient relationship into a doctor-victim relationship: the health-care person becomes the victim's enemy, one who can be instrumental in jeopardizing home, livelihood, and relationships. Involuntary testing may be more efficient in locating those infected to warn those at risk, but the cost is a significant loss of personhood for the victim and a radically changed role for the health-care professional. It would be like lawyers and accountants having a legal duty to report client wrongdoing —a good idea for law enforcement if it could work, but not so good for lawyer-client confidentiality and trust.

In sum, we must choose either the ethics of avoidance, with its painful inefficiencies, or the ethics of containment, with its profound effects on our settled morality. I think we are on the right track in sticking with the ethics of avoidance. What we must do is make it work.

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The President's Commission on HIV:

A Personal Report on Related Ethical and Moral Issues

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In the dictionary, "ethics" is defined as "a principle of right or good or correct behavior . . . arising from conscience or a sense of right and wrong." That is precisely what I hope we, as a commission reporting to the President on AIDS, will reflect in our recommendations—what is right and good and correct for the United States of America.

Three comments made before our commission have made a powerful impression on me. The first is something that Surgeon General Koop said: "I am the surgeon general of all the people. I do not have a choice in this matter." This has tremendous ramifications. Other secretaries of major governmental departments have appeared before us, and I have asked them if they consider themselves to be the secretary of all the people; some in their testimony clearly show that they do not. The second comment comes from the governor of Rhode Island, a state that has an excellent program for meeting the needs of AIDS patients. In his testimony he said that the primary goal of government is to protect the lives of its citizens—similar to what Dr. Axelrod says in his presentation in this issue. I trust that New York State Governor Mario Cuomo and New York State Commissioner of Health Axelrod have a similar view and a similar goal.

The third statement that deeply impressed me was extracted by others from John Stuart Mill's *On Liberty;* it is his principle that only likely harm can justify limits on liberty.

Let me briefly highlight some of the ethical issues our commission tried to face, which we hope will be reflected in our report.

Patient Care. I'm giving the question of the physician's responsibility to care for patients the least attention here because the section in this issue, "AIDS: The Duty to Treat," covers it extensively. I hope my concerns are already absolutely clear and I talk about them further in my discussion on social issues (below).

Research. We have tried to consider many of the problems raised about research, but we couldn't really hit the nail on the head in our report, perhaps because with 13 members on our panel, special or vested interests blurred or removed a tremendous number of highly pertinent issues. The research issues that concern me most are placebo trials, liability insurance, and drug profits.

I think we now all agree that placebo trials are probably no longer indicated in people who are terminally ill or in advanced stages of AIDS. Even the most academic observers seemed to agree on this in their testimony before us.

Liability insurance is a burr under my saddle, and we are going to have to do something about it. Is Congress going to? I don't know. The commission will have many more hours of hearings on it. We are working with the Institute of Medicine and with the AMA; they are holding separate conferences. Do we as a society really want to pay $100 to $300 million for liability insurance for a drug company's research on a vaccine? I am told by presidents of drug companies that this sum is actually very modest. We were told that approximately 95% of the cost of the diphtheria injection that children get goes to liability insurance. It seems to me our method of de-

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termining liability and awarding judgment is causing harm to society. It is not our commission's role to pass legislation; it is our role to try to highlight problems and take a stand. Most commission reports go into the circular file—I have no illusions about that. But this is my one chance, and I am going to make sure the liability issue is included.

Another concern of mine is excessive drug profits. The profiteering on drugs for the treatment of AIDS is staggering. This represents profiting from suffering and is completely unethical and immoral. I think this is something Congress should look at.

HIV Testing. I have tended to stay away from the issue of testing for HIV because I'm sure that as time goes by, society, the medical profession, and the patients will sort it out. We're certainly testing many more people than we were six months ago. Just to list some groups for whom it is generally agreed that voluntary screening is indicated, as long as confidentiality can be guaranteed: hemophiliacs and intravenous drug users, the homosexual and bisexual community, prostitutes, patients in clinics for sexually transmitted diseases, sexual partners of infected persons, the prison population, military recruits, people entering marriage contracts, and hospital patients.

Testing has progressed to the point that a panel of research scientists and laboratory people from across the country has indicated that if one adds a good history and examination to a Western blot test and repeats the test twice, false positive tests results are no longer a problem. False negatives remain, perhaps because no antibody has developed or because the patient has not had time since being infected to develop antibody.

Funding Patient Care. Who should pay for patient care was another area of concern to our hearings. Obviously, the insurance companies have an enormous vested interest in it. John J. Creeden, president and chief executive officer of Metropolitan Life, is on our commission. He estimates that in the next three to five years his company alone is going to lose over $2 billion because they are unable to test employees for HIV. Should Metropolitan Life absorb this loss? Is this what we want? A decision has to be made. Are we going to pay for patient care with taxes, or let the insurance companies pay, or are we going to slip it into the Medicare system, which is basically taxes? I do not know. I have no sense of how our commission is going to come out on this one.

My own personal view is to reconsider the issue as one of guns versus butter. I came to this commission a very conservative Republican; I am going out a social liberal. It seems to me a year or two of postponement of programs such as Star Wars—I mean if Star Wars goes off we're all dead—would make considerable resources available. The amount of money we are talking about for some of these social programs is small compared to military spending. When I first discussed this view with some gay friends I have made over the past six months, they said, "You've got Admiral Watkins there. You've got a military man heading the commission. How is that going to help us in any way?" Well, Admiral Watkins is one of our strongest supporters for social programs of this type.

Legal Issues. We have identified relatively few legal experts on AIDS; most lawyers tend to shy away from it because it is such a minefield and also because, being lawyers, they like to wait for the legal cases to appear and then develop their position. Some of the legal issues to consider:

The issue of criminality when a seropositive person knowingly transmits the virus is being approached state by state. Florida for example is seeking criminal penalties, and Nevada already has criminal penalties for knowingly transmitting HIV.

What about prostitutes? Many are HIV positive; among street prostitutes in New York City, as many as 30% test positive, but rates of infection in call girls are as low as 1%.

I've already gone into the liability issue. I feel very strongly that these enormous fees collected by lawyers for spurious lawsuits are both immoral and unethical for a profession.

Should we legalize drugs? This question will automatically throw any group into a two-week bomb-throwing session, and I won't go into it. But the Colombian drug lords would be out of business if we did legalize drugs. Obviously, the pros and cons are complicated; we are hearing testimony on both sides.

What should be done about the sodomy laws, and gay rights, in various states? To me personally, these issues are archaic; they should have been settled long ago. But again, I am not sure our commission will address them.

International Issues. Should we be experimenting in other countries? That's what we are doing—testing our vaccines in other countries, because liability makes testing too costly to do here. How widely should we screen immigrants?

In certain East African countries, we are seeing extremely high rates of HIV infection. What do we do about the international drug traffic? We will have recommendations to make on this. Almost all the experienced people have turned from concentrating on supply to concentrating on demand—which leads us into our societal problems.

Social Issues. One of the reasons our commission was attacked in the beginning was because it was thought we would be ideological. We've made every effort not to be. Our report is totally bipartisan. I would say many more liberals than conservatives testified, and their testimony is part of the document. We were able to sign off on the interim document last night with unanimous approval and no minority points of view (1).

Initially there was a lot of feeling among the members of the commission that we should stick to AIDS itself, and to the HIV problems. We resisted, and I think that has been the best decision we've made. The social issues are the ones that concern me the most, and the ones we've developed the most. Of all the social issues, drug abuse obviously is number one. The AIDS world is like a series of boxes, and each successive box seems to be a larger box, rather than a smaller. The problems contributing to drug abuse we as a society are facing are profoundly ethical problems for each and every one of us. In the commission's final report we have featured them.

Just yesterday the commission heard people dealing with homeless and abused and runaway children. One participant, Mrs. Bucey, was tremendously effective. The title of her talk was "To Whom Do These Children Belong?" There are 1.2 million or 1.3 million homeless kids—we really have no idea exactly how many—and a tremendous number of them come to the big cities. At least half of them are in prostitution and drugs. I told Mrs. Bucey these children belong to me, and they belong to you, and they belong to the Secretary of Education, who was sitting there, and they belong to all of us, and we cannot, in conscience, sit and have the budget for these people cut while we are increasing spending in other areas.

(An aside: one of the tragic things uncovered in looking at AIDS is the profoundly sad intertwining of the sex industry and the drug industry in this country. A woman acting in a porno film is generally high on cocaine to make sure her performance is good. And with drug abuse usually goes prostitution. This is not a victimless crime or a victimless industry.)

Now to address the underclass where drug abuse and AIDS flourish. A housing community in Chicago, is home to 30,000 people—and 93% are single-parent households; that means 93% of the families are headed by a single woman. The rates of violent crime, welfare dependency, teenage pregnancy, illiteracy, dropping out of school, never having held a job, and imprisonment are staggering. Repeatedly, people testify before us that three, four, and five times as many people in their community go to prison as go to college. These are desperate problems. We are building prisons as fast as we can and filling them faster than we can build them. It costs \$20,000 to \$40,000 a year to house a person in a prison. It costs about \$75,000 to build a jail cell. The young people who come out of the projects are going to prison. The average reading skills in Rikers Island and Greenhaven Prison are not above fifth-grade level. We are talking about a population than cannot read, and 70% are drug abusers. If a person cannot read, abuses drugs, has never held a job, and sees violent crime as a way of life, that person—in the terminology of the cancer ward—is a terminal case.

We have recommended a tremendous amount of money for drug treatment centers—tremendous, but not enough—\$2 billion over the next 10 years. But the yield in drug treatment is very low. At least we can try to get these people to the centers. At least we can try to get a dialogue going. But we must also address the underlying problems. The best work I have read (and I would love to hear from other people about this) is William Julius Wilson's *The Ghetto Underclass: Social Science Perspective* (Sage Publications, 1989). In the end, he says, jobs are the solution to these terrible problems. We have to give the person who is supporting the family a job. We have to get the man back in the family. Women cannot bring up crazy teenage boys alone. They require a collar. They require discipline. And these women, if you read Jonathan Kozol's *Rachel and Her Children: Homeless Families in America* (Crown, 1988), are driven crazy. A homeless family completely deteriorates within two years. What happens to the children deserves detailed attention. All the rest of us who are parents will understand what Kozol is saying.

The one thing I want to close with is that I am an old guy. I come from the 1940s, the 1950s—hey, the 30s. I have been distressed in my middle years by the onset of the "me" generation, I am sick to death of people talking "me, me, me." When I was talking in Albany recently, a young doctor got up and started whining about the fact that he was in debt, and he had to make more money. He thought it was a terrible abuse that he had to take care of AIDS patients. "God damn it," I said, "there are two big mistakes here. The first one is that you decided to go to medical school. The second even bigger one is that you were let into medical school."

I hope we can get away from this *me* and get back to *us*. If we are going to do something about this problem, about AIDS and the communities in which it thrives, that is what we are going to have to get back to.

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AIDS: The Duty to Treat

1988 AMA Position

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The American Medical Association Council on Ethical and Judicial Affairs is the final arbiter on ethical matters affecting the membership. Our Council is composed of seven practicing physicians, a resident, and a medical student; no full-time ethicists or philosophers are on staff, though we do have a full-time staff of two lawyers who specialize in ethical matters and can call on a panel of consultants. We meet about six times a year for two days.

We are charged with interpreting the principles of medical ethics. Since the foundation of the Association in 1847, we have had strong feelings about physicians' obligation to treat patients with contagious diseases, and their obligation not to refuse treatment to a class or a group of patients, which has always been explicitly stated in the principles.

William Boghurst, in a memoir on his experience in the great plague in 17th century London, maintained that every man who undertakes a profession, or any office, must take on all parts of it—good and bad, pleasure and pain, profit and inconvenience: ministers must preach, captains must fight, physicians must tend the sick. Like Boghurst, I think physicians assume the risks as well as the profit of their profession. Although in the yellow fever epidemic in 1793 in Philadelphia, a large number of physicians did flee the city (see Zinberg), Benjamin Rush, a physician who signed the Declaration of Independence, wrote in a letter to his wife, "if I should get sick, it would be as much your duty not to desert me in that situation as it is mine not to desert my patients."

The Council, in its recent writing on the physician's obligation to the patient who is HIV positive, did not discuss the duty to treat but rather focused on the principle that a physician may not refuse to treat a patient solely because the patient is seropositive. These patients constitute a class. In all states it is clearly illegal to refuse to treat a class of persons because of color, race, or religion; it must be equally unethical to withhold treatment from a class of patients because of their disease. In at least 16 states, AIDS patients have the status of handicapped, which makes it illegal to discriminate against them as a class.

There are reasons for not treating a seropositive patient: I am a neurosurgeon, and I think it would be legitimate for me not to treat a patient with *Pneumocystis* pneumonia, a disease about which I know nothing. However, it would be unethical for me to refuse to biopsy or treat a patient with an intracranial process solely because that patient was seropositive and it was some risk to me.

Many members of the Association and other physicians have pointed out what they see as an inconsistency between this view and our sixth principle of medical ethics, that a physician may choose who he or she wants to treat. We have always assumed that this principle does not support illegal or invidious discrimination.

Physicians run some risks in treating patients with AIDS, just as nurses and other health care workers do. The risk, fortunately, is low. It is hard to get AIDS. We should all recognize that physicians have a special status in our society and that with this special status goes an obligation to treat. I think the chances of a physician,

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particularly a surgeon, contracting a disease such as hepatitis B is far higher than the chance of ever getting AIDS. About 10% of surgeons turn positive for hepatitis each year. So far, to my knowledge, no surgeon has been infected with HIV.

The American Medical Association has little torque other than the ethical kind to exert on U.S. physicians. Our only recourse in enforcing our opinion in this matter would be censuring or expelling a physician from the Association. The likelihood of this happening is remote, since it involves a great deal of due process. One member would have to charge another member with being unethical. We would then have a hearing, with counsel and various other protective measures for the physician being charged. Perhaps it will come to this but I think quite possibly it will not. All we can do is talk to physicians of good will who are unclear about their obligations in the AIDS epidemic, saying that each is obligated to treat patients with AIDS if the illness falls within the physician's area of expertise. I urge surgeons to treat the patient with AIDS. I urge physicians who perform invasive procedures to treat those patients. It is in your job description. It is what society expects you to do. You ought to do it. Go ahead; you will not get AIDS.

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AIDS: The Duty to Treat

A Patient Advocate's Perspective

Richard D. Dunne

Acquired immune deficiency syndrome (AIDS) has been recognized as a clinical entity since at least 1981 and as a significant public health issue for nearly as long. Only fairly recently, however, has the public at large begun to recognize the economic, social, legal, and ethical dimensions of the AIDS epidemic. Among the most troubling ethical issues is the duty, if any, that physicians and other health care professionals have to treat persons with AIDS and human immunodeficiency virus (HIV) seropositivity.

We do not know, at this point, how many physicians have refused to treat AIDS patients or persons thought to be at high risk of HIV infection. Aside from a few well-publicized incidents of physicians (usually surgeons) publicly stating their intention of avoiding HIV-infected patients, we do not have much evidence. One does hear anecdotes about medical residents, surgeons, and others shunning AIDS patients or avoiding medical training programs in cities with a high incidence of AIDS, or referring patients to other physicians at the time of diagnosis, but there is little hard data.

One recent poll is actually encouraging: 74% of New York State physicians who responded said they either treat or would treat patients infected with HIV; the percentage for New York City physicians was even higher—91% (1). On the other hand, it is undeniable that a relatively small number of physicians are caring for an extremely disproportionate share of AIDS patients, suggesting that there may be a great deal of covert avoidance that is difficult to document or quantify.

It should surprise no one that, as an advocate for persons with AIDS, I believe that a duty to treat does exist; that it is related to but different from the individual's right to health care, which is primarily a claim against society and not any particular institution or individual; and that my beliefs are colored by my wish to live in the kind of society in which altruism remains a primary motivation of health care professionals.

Historical antecedents reveal a great deal of inconsistency in the way physicians have responded to infectious disease epidemics over the centuries (2). I would like to be able to report that it is only since AIDS that some physicians have fled from their obligations, but this is not the case. In general, I support the notion that physicians have the right to choose whom to treat and that there is a very small, manageable but real risk of infection incurred in treating HIV-positive patients, especially during invasive procedures. I do acknowledge that most of those who do not believe there is a responsibility to treat accept the notion that AIDS patients are entitled to competent medical care delivered in a compassionate and caring manner, so long as they themselves do not have to provide that care.

For myself, I have even less respect for those physicians who quietly refer their AIDS patients on diagnosis to another doctor, or who can't seem to schedule appointments with their gay patients, or who argue rather speciously that they don't have the knowledge to clinically manage AIDS patients, yet have demonstrated no interest in learning, than I do for those few, probably foolish physicians who have announced quite loudly their determination not to treat.

The American Medical Association, an organization whose policies and practices I have not always been comfortable with but which has tried very hard in the last several years to be

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responsive to the AIDS epidemic, has issued guidelines relevant to this issue (3). Briefly restated, the AMA concluded that physicians may not ethically refuse to treat a patient whose condition is within the physician's realm of competence solely because the patient is HIV seropositive. This position is consistent with AMA policy since its establishment. In 1847, for example, the first AMA code of medical ethics included this statement: "and when pestilence prevails it is [physicians'] duty to face the danger, and to continue their labors for the alleviation of the suffering, even at the jeopardy of their own lives" (4).

Competing Interests Make Tough Questions. Official statements by distinguished committees on ethics, while necessary and important, need to be applied in a world of competing interests, rights, and duties. Is there a duty to treat, and is it satisfied by referral to another doctor? How does society's obligation to assure access to competent medical care become actualized, and how is it balanced against the physician's right to treat whom he or she wishes?

Is there a practical way of compelling physicians to treat AIDS patients, and would patients want to be treated by unwilling, perhaps hostile practitioners? Does the record suggest that the medical profession is prepared to penalize uncompliant physicians on this issue? Does a surgeon have the right to refuse to perform elective surgery but not life-saving procedures?

Many of us are struggling with these questions. An anonymous nurse, writing in *The New York Times* Sunday Magazine, crystalized the issue when, out of fear for her own life and concern for her children and husband, she stated her intention to change jobs while hoping that if one of *her* loved ones is injured there will be someone there who *is* willing to take the risk (5).

For the most part, we have avoided answering these tough questions.We can no longer afford to do so. These are not intellectual or theoretical concerns. The medical needs of the 1 to 2 million Americans who are HIV infected will soon strain the nation's health care system, as has already happened in New York, San Francisco, and other cities. In time, virtually all physicians will encounter HIV-seropositive patients in their practice.

The Oath Creates the Physician. It seems to me that at the heart of the argument of those who emphasize the physician's rights over his or her duties to treat, with all of the attendant risks, is the notion that medicine is a business, much like any other. Not surprising, given the commercialization of so much health care in recent years.

I reject this model. A sick person is not just a "customer"; he or she has a moral claim on those in a position to help. The knowledge and skills of the physician are not the physician's alone. All of us have paid for it in one way or another, if only by being human subjects (otherwise known as patients) or taxpayers. It is an oath—the oath of Hippocrates or one of its modern equivalents—that separates physicians from others. This oath, not a medical degree, signals formal entry into the profession of medicine.

Privilege brings with it the burden and the joy of responsibility. Great privilege, whether in the form of financial compensation, social status, or the autonomy and freedom of professional work, carries with it great responsibility and duty to others.

We can do much worse than remind ourselves of the Oath of Hippocrates:

> With purity and with holiness I will pass my life and practice my art . . . into whatever houses I enter I will go into them for the benefit of the sick and . . . while I continue to keep this oath inviolate, may it be granted to me to enjoy life and the practice of my art, respected always by all men, but should I trepass and violate this oath, may the reverse be my lot.

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AIDS: The Duty to Treat

A Philosopher's Perspective

Anthony Preus, Ph.D.

In this paper I briefly outline some of the philosophical arguments which might support a duty to treat by individual professionals and by society. Then I consider the actual location of current problems which demand the philosophical consideration of a duty to treat persons with AIDS. Finally, I suggest some possible resolutions to these problems. I do not concentrate solely on the obligations of physicians, but also comment on the impact of a concept of a duty to treat on nurses and other health-care personnel.

Philosophic Arguments

A Professional Duty. There appears to be widespread, though not universal, agreement that health-care professionals have a duty to treat HIV-positive persons on the same basis as anyone else. Health-care professionals have, it is thought, accepted the risks of infection with the various life-threatening diseases with which they may come in contact as a part of their commitment to their professions. Both the American Medical Association (see Patterson summary) and the American Nursing Association (see ANA Code 1976, I4, 5) have explicitly endorsed that position. By becoming a professional, one has, it is argued, promised to treat patients equitably, without regard to the dangers of treating specific diseases. In Kantian terms, that would count as a perfect duty.

A Moral Duty. Even if it could be argued that one has not actually promised to treat HIV-positive patients, and that therefore treating is not a perfect duty, nonetheless treating counts as a Kantian imperfect duty, since every health-care professional would expect to receive medical treatment were he or she to become infected with a deadly disease, and therefore health-care professionals are obligated generally to treat persons infected with deadly diseases (though each professional is not necessarily obligated to treat each afflicted person). If the treatment of HIV-infected persons is an imperfect duty, each professional would have to participate equitably in such treatment and could not morally issue a blanket refusal to treat all such persons.

From a social point of view, we can apply the principle of distributive justice in health care. By John Rawls' theory of justice, the person infected with the HIV virus is, by virtue of the infection, among the worst-well-off members of society, and consequently has a substantial claim to a share of the resources of the health-care system. In this view, HIV-positive persons have some claim, distributively, on the skill and attention of the individual professionals who are part of the health-care system, a share that is equitable with the other demands, from persons suffering from other maladies, on the skill and attention of those professionals.

Social Utility. Even from the point of view of utility, it appears to be more socially useful that those who are HIV-positive have adequate medical attention rather than not. Not only is it possible to prolong the life of many who have already shown signs of acquired immune deficiency syndrome (AIDS), but medical care may make the remaining time of life of those who are infected more bearable, often more productive. So from the point of view of maximizing good for infected individuals, treatment is more useful than nontreatment.

In addition, it is socially necessary to provide care to those who may acquire the infection in

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the line of duty, so some HIV-positive persons must be treated, even from the purest utilitarian standpoint. Because it is not always easy to distinguish those who have acquired the infection in the line of duty and those who have acquired it otherwise, professionals have to be prepared to treat at least a considerable proportion of those so infected.

But medical intervention for infected persons may prove socially useful no matter how the infection was acquired, since intervention may reduce the probability of spreading the infection to other persons. If treating HIV-positive persons is socially useful, those who have the capacity to treat such persons have a (utilitarian) duty so to treat, because they have the duty to bring into the world more good, using their trained capacity to do so.

Reluctance to Treat: A Legal Compulsion? Although we argue that medical professionals have both a professional and a moral duty to treat HIV-positive persons equitably with all other persons, in practice there has been some reluctance to treat in accord with that duty. We should consider briefly two groups of professionals: those who attempt to avoid treating HIV-positive persons, and those who have willingly treated HIV-positive persons, and consequently have had more than their share of such patients.

Should professionals who avoid treating HIV-positive persons be legally compelled to treat? Zinberg argues, among other things, that such compulsion would result in both an inferior quality of care by those reluctant to participate, and avoidance of high-risk specializations, institutions, patients, and localities by those reluctant to accept whatever risk there may be. He does not need to argue that refusal is not immoral in order to maintain that compulsion is a bad idea; the legal enforcement of moral standards is often counterproductive in the ways he suggests. Moral disapproval of those who do not do their professional and moral duty to treat might in some cases be all that is socially required. However, as Zinberg suggests, when professionals are working in an institution, it becomes entirely impractical for them to avoid identified HIV-positive persons, since institutions have obligations to care for HIV-positive persons that are indeed founded in law and legally enforceable (see Dunne's discussion).

The other group we should consider are those who have willingly accepted the duty to treat, and consequently have been largely overburdened with AIDS, ARC, and HIV-positive patients. In a sense, one might want to say that they have simply been doing their duty, but in fact many have been doing far more then their duty, since they have taken on themselves the burden of care that ought, in equity, have been shared by those shunning such service. Consequently these people deserve to be recognized and rewarded for the service they have performed heroically, above and beyond the call of duty. Our government and our society have not yet recognized the achievements of those who have voluntarily taken on these extra burdens, ignoring any stigma for choosing to care for people other fellow professionals may look down on.

Practical Problems in Insuring Treatment

Attracting Health-Care Workers Who Have Patient Contact

One of the popular themes for news stories these days is a refusal by some health care facility or professional to treat an AIDS patient. If we were to believe some stories in the media, we might imagine it is impossible for anyone who is HIV positive to secure health care. My own inquiries, limited to Binghamton, NY, indicate that such stories greatly exaggerate the extent of the problem. Local acute-care hospitals appear to treat HIV-positive patients much as they do anyone else—when they know that a patient is HIV positive, they alert the staff that they are dealing with a "blood-transmitted infection," which could also mean hepatitis, for example. In the hospitals, there has been no large-scale revolt of nurses or anyone else against treating HIV-positive patients. There has instead been a marked increase of the use of protective gloves and goggles, and a good deal more caution in dealing with blood and other bodily fluids.

Anecdotally, some say that patients known to be HIV positive do not get the quality of care and attention from some health care workers that other patients receive. But cancer patients may not always get the most attention from health care workers either. Perhaps some health care workers cannot face treating patients whom they perceive as "marked for death" (see Strain's discussion).

In all institutions—hospitals, county-run and private nursing homes, and home health-care agencies—the problem is not so much that an individual declares, "I'll take care of anyone else, but not an AIDS patient," but rather, given the likelihood that a person who works in these institutions will be required to work with AIDS patients, that the institutions face increasing difficulty recruiting nurses, LPNs, and all workers with patient contact. If a person can choose between working at McDonalds or in a hospital at essentially the same wage, the possibility of exposure to AIDS may well bear on the decision. In fact, so far as nursing is concerned, the number of applicants for training has clearly decreased, while the demand has been increasing. Students able to complete today's demanding nursing program have many attractive career opportunities, some of them perceived as offering more professional autonomy, and possibly a more satisfactory lifestyle, than nursing (see Baumrin article). Probably the institutions were having some difficulty attracting and keeping the kind of employees they wanted even before AIDS, but the situation has gotten worse, and many administrators believe that AIDS has a lot to do with their staffing difficulties.

So when we talk about AIDS and the duty to treat at the lower-paid end of the health-care spectrum, the question really is not, in general, one of people choosing or preferring to treat some patients and not others, but rather a social problem: many people choose to avoid health-care jobs, partially because they perceive those jobs as significantly riskier than other available jobs.

There appear to me to be at least three possible solutions to the problem of attracting people to health careers in this environment.

Increase Low-End Wages. One solution is to increase the wages at the low end of the health-care spectrum until potential employees feel that the remuneration is sufficient to counterbalance the perceived risk. According to one nursing home administrator in Broome County, NY, that might mean raising the wages of his lowest-paid workers from the current $4 to perhaps $10 per hour.

Isolation and Segregated Institutions. Another solution is to isolate HIV-infected patients and to pay higher wages to those who work in wards or institutions treating these persons. This solution would be more economical, but it automatically casts doubt on the justice of the system. As an interim measure, the establishment of "intermediate-care facilities" specifically for AIDS patients may well be necessary, but it is not likely to be the best long-term solution (see Axelrod, Baumrin, Fox, and Strain articles). It is impossible to isolate HIV-positive persons from the general patient population because AIDS has a long period of latency, during which those persons may experience all forms of medical need—pregnancy, accidental trauma, cardiovascular disease, and so on. It cannot seriously be proposed that a parallel "HIV-positive" health care system be constructed.

In addition, the tests for HIV virus seem to yield some percentage of false positives (which would place non-HIV-infected persons in the HIV environment, if we imagine pretesting and institutional placement) and the tests do yield false negatives, since the antibodies to the virus seem not to show up until perhaps six months after infection (which would place some HIV-infected persons in the supposedly non-HIV environment). As a general policy, isolation won't work, and isn't really worth trying.

Insurance. A third solution is to provide an attractive insurance scheme to health-care personnel at risk for HIV infection. Since the incidence of infection of health-care workers appears to be very low (see Strain article), a high level of insurance at relatively low cost should be possible. Thus those who would accept some risk, but are concerned about the future of their families, would be reassured, at least about fulfilling their family obligations.

To sum up the obligations and how to meet them: Society, governmental bodies, social institutions are all obligated to care for those infected with HIV. As I have already suggested, distributive justice requires that persons infected with HIV should be treated to the same extent, with similar investment, as persons suffering from other infectious or communicable diseases. And there has been considerable recognition of that obligation by the federal and state governments: expedited Social Security Insurance and Medicaid eligibility and a steadily increasing investment in research for prevention, cure, and palliation, as well as regulations requiring institutions to treat AIDS sufferers as officially "handicapped persons," are signs of that recognition.

The second stage of the argument is essentially utilitarian: how do we calculate the cost of achieving parity of treatment for HIV-infected persons? I have suggested three ways of achieving the goal; no doubt an economist could calculate which of the three would be most efficient. There may be other methods I have not thought about, but it does seem to me essential that we develop some way of assuring the continuing entry into health-care careers of able people, even in the AIDS environment.

Physicians

The situation is rather different at the other end of the scale. Physicians are perceived to receive, in general, quite adequate compensation, even counting the element of risk of infection. Nevertheless, until recently only one physician in Broome County, NY, was willing to accept new AIDS patients. A few physicians continued to see people who had been their patients before contracting an HIV infection, but in effect one physician was treating everyone with AIDS in the county. Recently, a group practice has begun accepting AIDS patients, so that ongoing care is assured. But a number of questions remain:

- Are physicians obligated to continue to care for a person who becomes infected with HIV?
- Are primary care physicians obligated to accept a new patient who is infected with HIV?
- Are specialist physicians obligated to give consultations on HIV-infected patients?
- Are gynecologists and surgeons obligated to perform surgical procedures (or deliver babies) if the person is HIV infected?

As I have already noted, the AMA has spoken on the matter: physicians are indeed forbidden to refuse to care for HIV-infected persons on the basis of that infection. But not all physicians take note of the AMA position.

Some physicians argue that the risks of treating HIV-infected persons are great, the rewards of treating them small, and that anyway physicians have traditionally had the right to choose whom they shall and shall not treat. They say that this particular risk did not exist when they began the practice of medicine, so that it is a risk they had not obligated themselves to when they took their Hippocratic Oath.

Continuity of Care. In response, we may argue that physicians have a generally accepted obligation to continue to care for the patients they have agreed to accept, no matter what happens to those patients—whether it be HIV infection or something else. A physician might argue that it takes someone with specialized training to care for a person with the peculiar diseases summarized as AIDS-related complex and AIDS, and no doubt that is true, but that is a reason for consulting a specialist, not for transferring the care of a patient to another physician.

New Patients. The problem of a new patient is slightly different. Under what circumstances is one obligated to accept a new patient? I believe that HIV infection is relevant only for a person who specializes in the consequences of HIV infection; i.e., someone might specialize in such a way that she accepts *only* persons who are infected with the HIV virus—an AIDSologist, if you like (see Fox discussion of "plague doctors"). But other physicians are prima facie enjoined to erase the question of HIV infection as a criterion for acceptance of a person as a patient. If primary care physicians are accepting new patients, most of us would think it outrageous if they were to require a negative HIV test as a prerequisite for acceptance in their practice. We find it outrageous because the contact between a primary care physician and a patient does not entail a high likelihood of transferral of HIV infection. The primary care physician who selects out HIV-positive persons appears to be acting irrationally, treating a low degree of risk in a way that could only be appropriate, if at all, if the risk were high.

Consultations. Similarly it seems in general irrational for physicians to refuse to consult on HIV-infected patients. The Broome County physician who until recently was treating all the AIDS patients told me she had a difficult time getting consultations from her colleagues; even some psychiatrists did not want to consult. I can only imagine that many physicians are ignorant of the character of the HIV infection, that they believe they are dealing with something highly infectious, like the pneumonic form of the bubonic plague, rather than an agent transmitted only with difficulty, through sharing blood or sexual intercourse. Such physicians have an obligation to become educated on the character of the disease, and then to behave rationally toward those who are infected.

Surgeons. The risk in surgery is higher. Many excellent surgeons have been infected with hepatitis during surgery; HIV undoubtedly poses some risk.

A surgeon friend told me that he often finds a quantity of patient blood in his gloves. This is a clear danger. Ellen Goodman, in her syndicated column "AIDS: The Dilemma for Doctors," *Binghamton (NY) Press* Feb. 26, 1988, suggested that surgeons be permitted to require HIV testing of their patients prior to surgery, not to prompt a refusal to operate, but to ensure that adequate precautions are taken. The suggestion has some merit, but it suffers from the inaccuracy of the ELISA test, at least; there are bound to be a significant number of false positives, putting some non-HIV-infected persons at risk of being treated as if they were infected, and a number of false negatives, lulling the surgical team into a false sense of security in a potentially dangerous situation.

I suggest rather that for surgeons we consider two of the compensatory programs suggested for lower-paid health-care workers. Of the three alternatives, across-the-board increases in wages, segregated institutions, and an insurance scheme, the first would most assuredly not be appropriate: surgeons generally earn quite a lot of money already. Increasing the compensation of all surgeons for all surgery to assure appropriate surgery for HIV-positive persons seems totally uncalled for.

The second solution, segregation, may actually already occur de facto to some extent, although recommending it as a general policy is impractical; surgeons are already highly specialized, and we cannot expect many surgical teams to specialize only in persons infected with the HIV.

Any "segregation" of HIV-positive persons by refusal of physicians to treat them is, as I have argued, unethical. But where real danger exists, we should be prepared to offer additional recognition and compensation to volunteers when others have shirked their duty.

One appropriate response would be a variation of the insurance scheme. If all medical practitioners contribute to a fund for compensating those medical practitioners who may become infected with HIV, that is at least a symbolic recognition of the duty each physician owes to all the sick, without regard to the specific disease. And of course society at large could reasonably contribute to such a fund, since the care of HIV-infected persons in fact benefits everyone in society. Thus, although we cannot assure surgeons that they will not become infected with HIV virus, we could assure them that were their surgical career to be cut short by such an infection, at least their families would be financially secure. One would hope that that would be sufficient incentive, in addition to the clear statement that treatment is a professional duty, to assure that HIV-positive persons receive appropriate and needed medical treatment.

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AIDS: The Duty to Treat

A Physician-Lawyer's Perspective

JOEL M. ZINBERG, M.D., J.D.

Whether a physician has a duty to treat AIDS patients is quite different from the question of whether AIDS patients should be treated. No one, to my knowledge, argues they should not be treated. However, many take the seemingly unsettling position that each health care professional should be free to decide whether he or she will participate in such treatment.

Thus, when Dr. W. Dudly Johnson, a prominent Milwaukee cardiothoracic surgeon, said that he would test all of his open-heart surgery patients for AIDS and would refuse to operate on any found to be positive, he raised a lot of eyebrows (1). His position was unsettling because it conflicts with an idealized conception of doctors as selfless healers. Nevertheless, an increasing number of physicians both here (2) and abroad (3) have adopted that position. These physicians are not refusing to carry out a specific therapeutic or diagnostic procedure because it conflicts with acceptable medical practice (4). They are refusing to treat because of the patient's disease. Their refusal raises two questions. First, is there a duty to treat? Second, if, as I believe, there is no such duty, should we create such a duty—that is, under what circumstances and to what extent should physicians be compelled to treat AIDS patients against their will?

A variety of reasons are offered for physicians' refusal to treat AIDS patients. Most obvious is the doctor's fear of becoming infected. The studies to date, though not conclusive, suggest that the risk to medical personnel is probably small but not inconsequential. The risk of transmission from a needlestick injury appears to be less than 1% (5). The Centers for Disease Control has also reported three cases of HIV seroconversion by health care workers following non-needlestick exposures to the blood of HIV-positive patients (6). The virus was presumably transmitted through breaks in the skin or mucous membranes. An overall figure of 4 seroconversions after parenteral exposure among 649 health care workers has been reported (James Strain, in oral presentation on which his article in this issue is based). In addition, a laboratory technician with no known risk factors was reportedly infected while working with a concentrated HIV solution even though he wore gloves and a lab gown (7).

However, though the risk of infection appears to be low, it might help to view that risk through the eyes of the risk-takers. First is the fact that even if the risk of infection is low, the consequences are grave; the risk of death to a person, once infected, is very high. Second, certain fields of medicine, such as surgery, suffer much higher exposure to patients' blood than other branches of medicine. Cardiac and transplant surgery can last several hours. As one transplant surgeon described it to me, "It's like taking a bath in blood." Third, physicians in particular locales or treatment settings see a disproportionate percentage of AIDS patients—doctors in some city hospitals may have their entire service composed of AIDS patients (8). These physicians report many episodes of parenteral exposures, multiplying their risk.

Other physicians are less afraid for their personal safety but worry about the impact of treating AIDS patients on their other patients

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and their practice. One dental colleague told me "All I need is for people to find out I'm treating AIDS patients and my practice will disappear." Many hospitals are also afraid of being characterized as AIDS hospitals, fearing that patients will be scared away (9).

Finally, physicians trained in the postantibiotic era are extremely uneasy treating a disease like AIDS. For the first time in their careers they are helpless against a deadly infectious disease. They are unaccustomed to and unhappy with being in the position of earlier doctors who could comfort but not cure their patients.

Regardless of doctors' reasons, many people are surprised to hear doctors talk about refusing to treat sick patients. Whatever else it has done, the AIDS pandemic and the fears it has generated have brought physicians' duty to treat into sharp focus. It has forced us to critically examine the historical, professional, legal, and ethical determinants of physicians' obligation to treat patients they would rather not treat.

To place the issue in perspective, to date very few physicians have publicly refused to treat AIDS patients. Nor have AIDS patients gone untreated. However, we must temper this observation with two caveats: First, surface appearances can be deceiving. Treatment refusals need not be and are not as obvious as a physician barring the door to the hospital. Every day doctors consciously and unconsciously engage in subtle forms of treatment refusals not apparent to the general public. It may be the resident who just didn't have enough time to see the AIDS patient on her morning rounds; or the senior physician who is suddenly too busy right now with his private practice to help the housestaff with an AIDS service case; or the surgical resident who after reading the patient's chart graciously offers to let his junior resident perform the upcoming surgery; or the emergency room physician who puts off calling certain patients in the hope they will tire of waiting and leave.

The second caveat is that even if treatment refusals are not a problem now they may become one. Discomfort with treating AIDS patients is widespread. A survey presented at the Third International Conference on AIDS in June 1987 reported that one-fourth of 250 residents questioned at New York City hospitals said they would prefer not to treat AIDS patients and that they believed it was not unethical to refuse to treat these patients (10). There already are indications that medical school graduates are reorienting their residency preferences away from cities and hospitals with high concentrations of AIDS patients and away from specialties which most frequently care for AIDS patients (11).

We must also consider that far and away the most common AIDS victims, gays and intravenous-drug abusers, were unpopular in the medical community long before anyone ever heard of AIDS. One need only ask physicians who finished their training in the last few years to discover the terms of opprobrium commonly applied to these groups. In addition, some persons in and out of medicine have promoted the perception that AIDS patients brought the curse upon themselves and that this justifies ignoring their treatment. Clearly, these high-risk groups, historically targets of discrimination, may find it increasingly difficult to obtain health care.

Finally, we must realize that we are not talking about the care of a few isolated patients. Large urban areas—New York, San Francisco, and Los Angeles—already have thousands of AIDS patients (12) and many times more carry the AIDS virus, HIV (13). By all accounts these numbers are expected to grow. This issue is of particular importance to those of us who live and practice in the New York City metropolitan area, where 35% of the nation's AIDS patients live (14).

Now for the central issue: Should physicians have a duty to treat AIDS patients? I say "should" because, as I explain, I do not think there now is such a duty. The professional codes and the historical, ethical, and legal background do not provide a solid foundation for such a duty. Therefore, the question is, Should we create such a duty?

Professional Duty to Treat. With one exception, medical ethics codes have not suggested that physicians have a duty to treat every patient. The codes speak generally about treating the sick: the Hippocratic Oath says, "I will apply dietetic measures for the benefit of the sick. . . . I will keep them from harm and injustice" (15); the World Medical Association's Declaration of Geneva declares, "the health of my patient will be my first consideration" (16). But they always paint the physician-patient relationship as voluntary. In fact, since 1912, Principle VI of the AMA code specifies "A physician shall . . . be free to choose whom to serve, with whom to associate, and the environment in which to provide medical services" (17).

The lone exception in this history is a phrase in the 1847 code of the American Medical Association instructing physicians that "when pestilence prevails, it is their [physicians'] duty to face the danger, and to continue their labors for the alleviation of the suffering, even at the jeopardy of their own lives" (18). However, even this phrase was deleted from the code in 1957.

In the last few months everyone has reexamined their consciences. On November 12, 1987, the AMA Council on Ethical and Judicial Affairs filed a report, published in the current issue of JAMA: "Ethical Issues Involved in the Growing AIDS Crisis" (19). The report states that "A physician may not ethically refuse to treat a patient . . . solely because the patient is seropositive." Six days later the New Jersey Board of Medical Examiners followed suit, declaring that "A licensee of this Board may not categorically refuse to treat a patient who has AIDS or AIDS related complex, or an H.I.V. positive blood test" (20). Finally, less than a month later, the Associated Medical Schools of New York State recommended the dismissal of any medical faculty member, resident, or medical student who refuses to treat an AIDS patient (21). The sole dissenting voice in this flood of New Year's ethical resolutions came from the rugged individualists of the Texas Medical Association, who gave their members the option of treating or transferring AIDS patients (22).

These new proclamations discovered this ethical duty in the medical community's "tradition" of "care, sacrifice, and courage." But is there really such a tradition? We might ask, much as Hotspur did in Shakespeare's Henry V (part I), When the tradition called for sacrifice and courage, did anyone answer?

Historical Duty to Treat. The sad fact is the medical community did not always answer. Indeed, as Zugar and Miles pointed out in their excellent piece in the October JAMA (23), the historical response of physicians to other deadly diseases has been something of a mixed bag. During the European plagues of the fourteenth, fifteenth, and sixteenth centuries, physicians were often among the first to flee infected cities (24). Doctors acquiesced in the confinement of lepers to isolated colonies even in this century, well after the true nature of the disease was known. The thoughtful article in this past Sunday's *New York Times Magazine* highlights the analogy between the isolation of lepers and AIDS patients (25). Yet there have also been instances of heroic actions, such as the physicians who remained in East Coast cities during the yellow fever epidemics of the eighteenth century, and the physicians who went to treat victims of atomic bombs in Hiroshima and Nagasaki in 1945 (26).

Ethical Duty to Treat. Although the history and traditions of medicine provide only a shaky foundation for a duty to care for HIV-infected persons, perhaps we can find this duty in underlying ethical principles. Two moral principles, beneficence and autonomy, underlie most modern formulations of medical ethics (26). Yet neither would impose a duty to treat.

Beneficence requires physicians to provide benefits to their patients and to prevent or remove harmful influences. But concepts of what is to the patient's benefit may differ markedly from physician to physician and between physician and patient. Our beneficent physician may decide that an experimental laetrile-type drug is in the patient's best interest, or that telling the patient's employer that the patient has AIDS might in some way aid the patient's work situation. Most medical philosophers would think it irrational to let the doctor decide on his or her own what is in the patient's best interest (27).

The more popular principle is patient autonomy (28). But autonomy stands for the right to accept or refuse care—not the right to demand care. (I consider the physician's own autonomy below.)

An alternative suggested in the JAMA article (23) is a return to a virtue-based medical ethic. Unfortunately, there is little agreement in general on which virtues should be guiding and more specifically which virtues are important in medicine. Moreover, there is no guarantee that pursuing virtue in medicine will necessarily lead to correct conduct or the correct result. For example, a physician whose theory of virtue led her to try to always benefit the patient might benefit the patient by violating his autonomy or by distributing resources in an unfair manner; either way the doctor's virtue of benevolence led to the wrong act. As Robert Veatch phrases it, "The question can be put quite simply: when we enter an urban hospital in a strange city, are we more concerned about having the physician do the right thing or act with the right motive? I think it can be reasonably said that . . . we are much more concerned about conduct then [sic] virtuous character" (29).

Legal Duty to Treat. Finally we arrive at the law. As Alexis de Tocqueville observed, in America every dispute eventually finds its way to court; AIDS is no exception.

In recent years, society has taken steps toward ensuring access to health care through a variety of insurance and social welfare programs. Public support of hospitals and medical research and education has led to the "socialization of medicine"—"medicine has become an element of social or civil policy" (30). Some commentators have even spoken of a "right to health care," although not everyone agrees (31).

Regardless of changing societal perspectives on medicine, the individual physician-patient relationship is voluntary and consensual. There is no common-law duty to treat any patient, just as there is no common-law duty to rescue strangers or to stop and help at an accident. Patients may choose their doctors and may consent to or refuse any proposed treatment. Similarly, physicians can choose their patients even if no other physician may be readily available to care for the patient (32). Although most states have enacted "Good Samaritan" statutes to shield physicians from liability if they render aid at accidents, these statutes do not require such aid (33). Physicians have been free to refuse patients who cannot pay or lack the proper kind of insurance coverage. Similarly, they have been free to refuse to perform certain procedures, such as abortions or sterilizations.

Once a physician accepts a patient, he or she must exercise reasonable care and cannot abandon a patient in the midst of treatment without providing alternative, competent medical care. But this obligation does not continue indefinitely. A physician who treated a patient in the past and is considered the family doctor has no legal duty to treat the patient for a new illness (34). A consulting physician who examined a patient at the request of a primary physician is generally not obligated to treat the patient (35).

Although there is no common-law duty to treat, can we find this duty in constitutional and statutory prohibitions against discrimination? The answer for the individual physician is No. Antidiscrimination statutes generally can only be enforced when there is some discriminatory action by the state or in a public accommodation. But private physicians' actions are not state actions, and their offices are not public accommodations (36). Public hospitals, in contrast, would most likely be forbidden under the antidiscrimination laws from refusing care to a person solely because they had AIDS or were HIV positive.

Hospitals might be forced under these statutes to treat AIDS patients even though, as a general rule, with the exception of patients brought to an established hospital emergency room, neither private nor public hospitals have a duty to accept and treat everyone (37). In turn, a hospital would attempt to force its staff to treat these patients. Hospital guidelines and bylaws could be used to enforce a pro-treatment policy. Private hospitals have wide latitude in making and enforcing their policies. Public hospitals have slightly less leeway but would most likely have litle trouble sustaining such a policy (38). Residents and students have even less procedural protections against dismissal by the hospital (39).

Should We Impose a Duty to Treat? Although there is no clear historical, ethical, or legal duty to treat AIDS patients, the notion of refusing to treat patients solely because of their disease is unsettling. Thus, we return to the central question: Should we—by state and local statutes, or by hospital guidelines and bylaws, or by professional codes—impose a duty to treat AIDS patients?

My answer at this time is No. I do not give this answer because I think AIDS patients shouldn't be treated. On the contrary, I believe they should be treated, and I have every confidence that the profession, as a whole, will meet the challenge. However, more importantly, I also believe that a policy of compulsion has serious social drawbacks and that such a drastic remedy is neither desirable nor necessary at this time.

Most of our rights and freedoms are based on the values of individual liberty and autonomy. Any social control over individual autonomy must be limited to situations in which the need or harm to be avoided is so great that, on balance, we are willing to sacrifice the individual for the public good (40).

AIDS patients have rightly demanded and been the beneficiaries of this attention to individual autonomy. For example, they have resisted compulsory AIDS testing and notification to third parties, even if there is a potential risk to a known third party, on the ground that these invade their privacy and their right to confidentiality. It seems somehow incongruous that we will not compel testing of AIDS patients and will safeguard their confidentiality, yet we contemplate forcing physicians to treat them. Autonomy is a two-way street. The personal and professional autonomy of the physician must also be respected. Just as no one would force patients to go to HIV-positive physicians, no one should force physicians to treat HIV-positive patients. Compulsion is a slippery slope. Once we open the door we must begin to wonder what other types of compulsion are around the corner.

In addition to undermining autonomy, a policy of compulsion would be unwise for other reasons as well:

First: Short of putting police guards in every doctor's office and in every hospital, compulsory treatment would be very difficult to enforce as a practical matter. The subtle forms of discrimination outlined above will make enforcement of any policy difficult and uneven.

Second: Compulsion would significantly add to the medical profession's existing legal and insurance problems by spawning a whole new class of antidiscrimination-based lawsuits. It would be irrational to think that we could impose a legally enforceable duty and not invite lawsuits to enforce the duty and collect damages for alleged derelictions. At the same time the policy will incite lawsuits from physicians fighting their dismissal or revocation of privileges.

Third: Any such policy would impact unfairly within the medical community. Doctors who are in the least powerful positions—residents, students and staff physicians—would bear the brunt of such a policy, whereas private physicians would be relatively untouched.

Fourth: A policy of compulsion may accelerate the redistribution within medicine away from specialties most likely to treat AIDS patients and away from cities with high AIDS populations.

Fifth: Compulsion would lead to a mediocre level of reluctant medical care.

AIDS represents a tremendous problem for our society. Ensuring the welfare of AIDS patients is a substantial challenge. Nevertheless, I think there must be a much greater showing of an actual crisis—substantial denial of AIDS patients' access to medical care—before curtailing anyone's autonomy. Until then, jumping to a policy of compulsion may be as symptomatic of the AIDS crisis as anything else.

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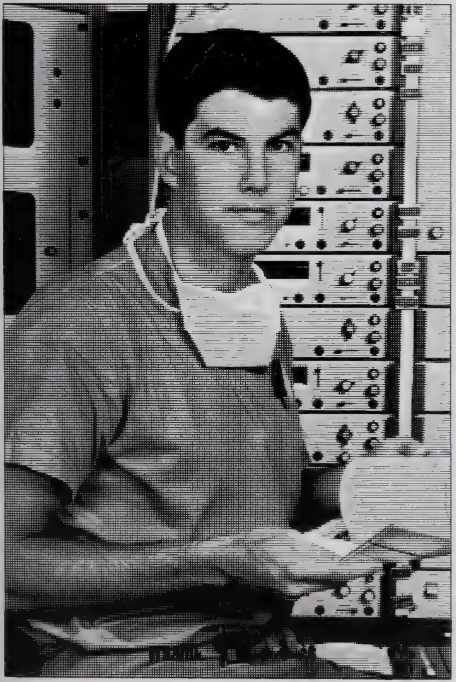

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CONTENTS

GENERAL ARTICLES

Iatrogenic Illness in a Department of General Internal Medicine: A Prospective Study *A. de la Sierra, F. Cardellach, E. Cobo, A. Bove, M. Roige, M. J. Santos, M. Ingelmo and A. Urbano-Marquez* 267

The Role of Sympathetic Innervation and Sympathomimetics in Gastric Secretion In Vivo *Donal F. Magee* 272

Cardiopulmonary Resuscitation: Qualifications and Performance of Housestaff and Trained Internists *Mary T. Donofrio, Deborah M. Barron, Stephen L. Winters, J. Anthony Gomes, and Richard Gorlin* 279

Peripartum Cardiomyopathy: A Role for Cardiac Stress Determinants Other than Pregnancy? *Jonathan Stamler, Steven F. Horowitz, Martin E. Goldman, Deborah Matza, and Josef Machac* 285

Sonography in Early Pregnancy: The Significance of Subchorionic Hemorrhage *Claude Bloch, Albert Altchek, and Miriam Levy-Ravetch* 290

CASE REPORTS

Amiodarone Hepatotoxicity: Progression from Steatosis to Cirrhosis *Nancy Bach, Barbara L. Schultz, Lawrence B. Cohen, Anthony Squire, Ronald Gordon, Swan N. Thung, and Fenton Schaffner* 293

Tuberculous Abscess of the Pancreas in AIDS: CT Findings *Barry D. Berson, David S. Mendelson, and Cynthia L. Janus* 297

continued inside

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F MEDICINE

VOLUME 56
NUMBER 4
SEPTEMBER 1989

CONTENTS *continued*

Pulmonary Actinomycosis in a Patient with HIV Infection *Ari Klapholz, Wilfredo Talavera, Edwarda Rorat, Edwin Salsitz, and Carol Widrow* 300

Isolated Dislocation of the Radial Head *Peter F. Sturm, Judith Levine, Elias D. Sedlin, and Richard I. Ulin* 304

Infratentorial Intratumoral Hemorrhage *Eli Reichenthal, Abraham B. Rubinstein, and Mathias L. Cohen* 309

Fever Caused by Leaking Atherosclerotic Abdominal Aortic Aneurysm *Giora Katz, Ahmed Eid, Avraham Rivkind, and Yaacov Berlatzky* 315

Mesenteric Fibromatosis in Gardner's Syndrome *Cristina Frexes Keusch and Joel Bauer* 318

ENVIRONMENTAL MEDICINE NOTES Alf Fischbein, editor

Asbestos-Associated Rounded Atelectasis: A Case Report and Review of the Literature *Alfred Franzblau* 321

OPHTHALMOLOGY NOTES Keith M. Zinn, editor

Endogenous *Klebsiella* Endophthalmitis: Case Report *Ronald M. Glassman, Theodore T. Lieberman, Alan H. Friedman, Wayne Fuchs, Murray A. Meltzer, and Lester Gabrilove* 326

RADIOLOGIC NOTES Jack G. Rabinowitz, editor

Sonographic Findings in Necrotizing Enterocolitis with Paucity of Abdominal Gas as the Initial Symptom *Brighita Weinberg, Victor Emilio Peralta, Evangelos E. Diakoumakis, Kumudini D. Shah, Joel Mollin, Meenakshi K. Jhaveri, and Burton Seife* 330

STUDENT CORNER

Intestinal Endometriosis and Its Complications: Case Report and Review *Mary R. Cuzzo-Kriner* 334

New Directions in the Management of Zollinger-Ellison Syndrome *Stephen Zuckerman* 338

Index to Advertisers

Eli Lilly and Company	cover 3
The Journal of Philosophy	page 344

THE MOUNT SINAI JOURNAL OF MEDICINE
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Iatrogenic Illness in a Department of General Internal Medicine:

A Prospective Study

A. DE LA SIERRA, M.D., F. CARDELLACH, M.D., E. COBO, M.D., A. BOVÉ, M.D., M. ROIGÉ, N.S., M. J. SANTOS, N.S., M. INGELMO, M.D., AND A. URBANO-MÁRQUEZ, M.D.

Abstract

The incidence and causes of iatrogenic illness in a department of internal medicine were studied prospectively in 1,176 patients admitted from 1 January 1986 to 31 December 1986. A total of 295 patients (25.1%) developed 367 episodes of iatrogenic illness. Phlebitis occurred most frequently (75.2% of all iatrogenic events), followed by drug reactions (10.7%), contusion (4.6%), and urinary tract infections (1.4%). Nineteen patients developed life-threatening events (in 2 it was the cause of death). Etiologic agents included intravenous catheter (79% of all adverse reactions), drugs (9.5%), falls from bed (5.4%), diagnostic procedures (3.3%), and urinary catheterization (1.6%). Risk factors associated with iatrogenic illness were hospital stay longer than 12 days, female sex, poor general medical status on admission, intravenous catheterization, and intravenously administered antibiotics and anticoagulants. We conclude that in our hospital (a) 25% of the inpatient admissions to the general medicine service resulted in iatrogenic illness, (b) most iatrogenic illnesses were not severe (phlebitis), but 2 of 19 patients with life-threatening events died, and (c) the probability of developing iatrogenic illness generally depended on long hospital stay, poor general status at admission, and the use of both intravenous catheters and medication. In our patients, a reduction of hospital stay and a rational limitation of these procedures may diminish the rate of complications.

In the last few years there has been a remarkable advance in diagnostic and therapeutic technology. However, its utilization has resulted in an increased incidence of iatrogenic illness. These events are considered "the price of modern medicine" (1) or "the diseases of medical progress" (2) and are defined as "those diseases that would not have happened if a specific therapeutic or diagnostic procedure had not been used" (2).

Iatrogenic pathology can appear in any medical setting, but it has a higher incidence and severity in hospitals. Several factors may be involved: the large number of diagnostic procedures and their complexity; the use of new, highly efficient drugs which have more dangerous side effects; and the increasing number of old patients.

Two studies (3, 4) have demonstrated that 20% to 36% of all inpatients in internal medicine departments develop iatrogenic illness.

Our aim was to determine the frequency and characteristics of iatrogenic illnesses in our Department of General Internal Medicine and to identify possible risk factors, with a view to prevention, if possible, and thus to a reduction in the incidence of iatrogenic illness.

Patients and Methods

Patients. We studied the 1,176 consecutive admissions to our Department of General Internal Medicine (Hospital Clínic i Provincial, Barcelona, Spain) in the one-year period from 1 January 1986 to 31 December 1986.

From the Departments of General Internal Medicine and Biostatistics (EC), Hospital Clínic i Provincial, School of Medicine, University of Barcelona. Address reprint requests to F. Cardellach, M.D., Department of General Internal Medicine, Hospital Clínic i Provincial, Villarroel 170, 08036 Barcelona, Spain.

Potential Risk Factors. We recorded several factors that could be involved in the development of iatrogenic illness and grouped them into three categories:

General data: age, sex, route of admission (elective or emergency), general status on admission (severe if the death of the patient could be expected during hospitalization, and not severe if this was not the case), state of consciousness (alert, obtunded or comatose), and the main diagnosis at discharge. The diagnosis was recorded by one of us (AS) who grouped the conditions into 11 categories: infection, neoplasia, digestive, cardiovascular, respiratory, renal, hematologic, neurologic, endocrine, systemic, and rheumatic diseases. Infectious and neoplastic etiologies were included in the general category of "infection" or "neoplasia," independently of the affected organ.

Diagnostic and therapeutic procedures: intravenous catheterization (type, days, number of catheters), bladder and nasogastric tubes, arterial and venous punctures, radiologic-related explorations, and pleural, abdominal, and lumbar punctures.

Medication: duration in days, type, and route of administration of each drug.

Criteria for Iatrogenic Illness. We chose the definition of iatrogenic illness of Steel et al (4): an adverse situation due to any diagnostic or therapeutic procedure, as well as those harmful events occurring during hospitalization that are not a direct consequence of the disease of the patient, but do have a specific etiology. In fact, we counted only those events for which a specific responsible factor could be identified. For instance, a contusion or fracture was counted only if it was traceable to, for instance, a known fall out of bed; a hospital-acquired urinary bladder infection was excluded if no causative procedure, such as urinary bladder catheterization, had been performed.

Each episode of iatrogenic illness was recorded by residents and was verified and collected by two authors of the study (AS, FC). Type, etiology, whether it was severe (life-threatening) or not, length of illness, time of development, and delay in discharge from hospital were recorded for each occurrence of iatrogenic illness.

Statistics. Pearson's chi square and Student's *t*-test (two-tailed) were used to analyze the association between each possible risk factor and iatrogenic illness.

For the multivariate analysis we used the log-linear models (5) that are included in the BMDP statistical software (6). We chose a model relating the dependent variable (iatrogenic illness) to age, sex, and general medical status on admission and tested whether these three variables affected the analysis.

Results

Characteristics of the Study Population. Of the total 1,176 patients studied, 50.9% were male and 49.1% female, with a mean age of 61.7 ± 17.8 years (mean ± SD); 81.6% of patients were admitted from the emergency room. The mean stay was 12.44 days (range 1–68 days). At admission, 64.8% were severely ill, and 35.2% were mildly ill; 87.8% were alert, 10.7% obtunded, and 1.5% were in coma. At discharge, the most frequent diagnoses were infectious (19.9%), digestive (17.6%), and cardiovascular (15.7%) diseases.

A total of 68.5% of all patients received an intravenous catheter, for a mean duration of 5.0 ± 4.1 days; 72.8% of these catheterized patients received a short catheter and 49.6% a long one (31.6% received more than one catheter). Urinary tubes were used in 7.7% and nasogastric tubes in 7.6% of all admitted patients.

All patients had at least 1 venous puncture, with a mean (±SD) of 2.7 ± 2.2 per patient. The mean number of arterial punctures, in the 190 patients in whom this was performed, was 1.6 ± 0.9 (mean ± SD).

Most patients received some form of medication, mainly orally or intravenously. The drugs most commonly used were antibiotics (52.6% of all treated patients), diuretics (32.2%), and analgesic and nonsteroidal antiinflammatory agents (30.9%).

Incidence and Characteristics of Iatrogenic Illness. Of the 1,176 patients studied, 295 (25.1%) had 367 events of iatrogenic illness. For 11 of the 295 patients, these iatrogenic events were the direct cause of a delay in discharge from the hospital (mean ± SD number of days of delay was 9.9 ± 2.3 days).

Complications most frequently identified were phlebitis (75.2% of all iatrogenic events), contusions (4.6%), extravasation of infusion substances (3.5%), epigastric pain (3.5%), allergic reactions (1.9%), bleeding (1.6%), urinary infection (1.4%), and aspiration of contrast material (1.1%) (Table 1). In 19 patients iatrogenic illness was considered life-threatening and it was the cause of death in two (a hemorrhagic stroke in a patient being treated with intravenous heparin and intoxication by lithium carbonate administered for granulocytopenia) (Table 1).

The main causes of iatrogenic illness were intravenous catheters (79%), followed by adverse reactions to drugs (9.5%), falls from bed (5.4%), diagnostic procedures (3.3%), and urinary bladder catheterization (1.6%) (Table 2). There was no difference between long- and short-catheter-associated phlebitis. Antibiotics and anticoagulants were the main causes of drug-induced iatrogenic illness (45.7% and 14.3% of all adverse drug reactions, respectively).

Risk Factors for Iatrogenic Illness. Patients were categorized into two groups: 295 who developed iatrogenic illness and 881 who were not affected. The relationship between iatrogenic illness and all possible risk factors was studied by means of simple and multivariate analyses.

Analysis of association of single variables: In patients with iatrogenic illness, as compared with those without it, the following factors were predominant (data in mean ± SD):

older age (64.0 ± 17.3 vs 60.9 ± 17.9 years) ($p = 0.0104$)
female sex (59.2% vs 45.7%) ($p = 0.0001$)
longer hospital stay (15.3 ± 10.7 vs. 11.5 ± 8.4 days) ($p < 0.0001$)
worse general status on admission (75.5% vs. 61.2%) ($p < 0.0001$)

Furthermore, those patients had a higher mortality (10.2% vs. 6.6%) ($p = 0.0406$). We did not find any relationship between the principal diagnosis and the incidence of iatrogenic illness.

Iatrogenic illness was more frequent in patients given

intravenous catheterization (34.5% vs. 4.3%) ($p < 0.0001$)
urinary bladder catheterization (38.9% vs. 23.8%) ($p = 0.0015$)
antibiotics (32.8% vs. 16.3%) ($p < 0.0001$)
anticoagulants (36.3% vs. 22.9%) ($p = 0.0001$)
cardiotonic drugs (33.3% vs. 23.0%) ($p = 0.0011$)
oxygen (32.1% vs. 22.5%) ($p = 0.0008$)

Patients who had intravenous catheterization but who were not given any medication by this route showed a higher rate of iatrogenic events (22.7%) than those treated with intravenous medication without catheterization (8.7%) ($p < 0.0001$).

Multivariate analysis. When the variables age, sex, and general medical status on admission were analyzed, the main risk factors for iatrogenic illness were found to be poor general status on admission and female sex.

We then tested the relationship between other risk factors adjusted by age, sex, and general medical status on admission. Only a long hospital stay (more than 12 days), intravenous catheterization, and the use of antibiotics and anticoagulant drugs by the intravenous route showed a close relationship with iatrogenic illness.

Discussion

In our study, one of every four patients developed some form of iatrogenic illness. This rate (25%) falls between those reported in what are to our knowledge the two main studies performed to date. It is higher than the 20% reported by Schimmel in 1964 (3) but lower than the 36% reported by Steel et al in 1981 (4). However, this latter study included patients admitted to an intensive care unit; these patients have a higher probability of developing iatrogenic illnesses than those admitted to a general ward, as Steel and colleagues acknowledge in their own report of results.

The high rate of iatrogenic illness in our study was associated with insertion of intravenous catheters and/or with administration of intravenous medication (78.7% of all iatrogenic events), whereas the rate associated with drugs was relatively low (9.5%). This aspect of our results clearly differs from the findings in Schimmel (3) and Steel et al (4), in which adverse reactions to drugs were the primary cause of iatrogenic illness (up to 50%). In respect to the study by Steel et al (4), these differences could be due to the characteristics of some patients included in the study who were from an intensive care unit and who received medications (mainly intrave-

TABLE 1
Complications of Iatrogenic Illness in 1,176 Patients

	All iatrogenic events No. (%)	Life threatening No.
Phlebitis	276 (75.2)	
Contusion	17 (4.6)	
Extravasation	13 (3.5)	
Gastric pain	13 (3.5)	
Allergy	7 (1.9)	
Anaphylactic shock		1
Bleeding	6 (1.6)	
Acute gastric		4
Urinary infection	5 (1.4)	2
Aspiration of contrast substances	4 (1.1)	2
Pneumothorax	3 (0.8)	3
Mistake on administration	3 (0.8)	
Fracture	2 (0.5)	1
Diarrhea	2 (0.5)	
Electrolytic abnormalities	2 (0.5)	1
Renal failure	2 (0.5)	2
Drug fever	2 (0.5)	
Drug hepatotoxicity	1 (0.3)	
Cerebral bleeding	1 (0.3)	1*
Aplasia	1 (0.3)	
Medullar		1
Other	7 (1.9)	
Lithium carbonate intoxication		1*

* Direct cause of patient's death.

TABLE 2

Etiology of Iatrogenic Illness in 1,176 Patients

	All iatrogenic events				% of exposed patients	
Etiology	No.		%			
Catheter	290*		79		36	
Long		108		35.2		25.6
Short		188		64.8		32.1
Drug	35		9.5		3.1	
Antibiotics		16		45.7		2.6
Anticoagulants		5		14.3		2.7
Analgesics		2		5.7		0.6
Cytostatics		2		5.7		
Vasodilators		1		2.9		0.7
Broncodilators		1		2.9		0.5
Steroids		1		2.9		0.4
Diuretics		1		2.9		0.3
Other		6		17.1		
Falls	20		5.4			
Complementary procedures	12		3.3		1.9	
Radiology		7		58.3		1.9
Punctures		3		25		1.9
Endoscopy		2		16.7		1.6
Urinary catheterization	6		1.6		6.7	

* Total is less than the apparently correct number because 31.6% of catheterized patients underwent more than one catheterization.

nous antiarrhythmic and vasodilator drugs) seldom used on general wards.

The rate of phlebitis in our patients with intravenous catheters (25%) was similar to that found in other studies (7, 8). We did not find any difference in rates of iatrogenic illnesses induced by short and by long catheters. But intravenously catheterized patients who received no medication showed a higher rate of complications than those receiving intravenous medication without catheters (9, 10). These results suggest that, in our patients, the main factor provoking phlebitis could have been the physical irritation induced by the catheter.

In our study, iatrogenic illness was generally mild. Only 19 patients developed life-threatening events, and the iatrogenically induced event was considered the direct cause of death in two.

Most of the analyzed factors correlated individually with iatrogenic illness, but multivariate analysis reduced the number of statistically significant factors to five:

intravenous catheterization
intravenously administered antibiotics and anticoagulants
poor general medical status on admission
hospital stay longer than 12 days
female sex

Those risk factors that were not statistically significant risks when adjusted for age, sex, and general status on admission fell upon patients who were female and had poor general status on admission. Moreover, the higher rate of mortality in patients with iatrogenic events was observed only in the analysis of single variables but not in multivariate analysis; this fact also suggests that iatrogenic illnesses could be a consequence of age over 70, female sex, and poor general status on admission rather than the inciting agent itself. The relationship we found between old age and iatrogenic illness in the analysis of single variables could be explained by the high incidence of female sex ($p < 0.0001$) and worse general status on admission ($p < 0.0001$) in patients older than 70. Our finding that female sex constitutes an individual risk factor for iatrogenic illness was a surprise; however, we also found that females had longer hospital stays than males (mean 13.8 days ± SD 9.4 days vs. 11.1 days ± 8.8 days) ($p < 0.0001$).

In our study, intravenous catheterization and the use of intravenous drugs, especially antibiotics and anticoagulants, were the most important risk factors for iatrogenic illness. This fact seems logical because the high rate of iatrogenic illness was due to phlebitis.

We consider it relevant that our study was performed in a general internal medicine department of a highly qualified hospital. The risk of developing iatrogenic illness in other situations, such as surgical wards or regional hospitals, may be very different. The general status of inpatients as well as the availability and use of numerous, often aggressive diagnostic and therapeutic procedures may in part be responsible for the rate of iatrogenic illness. Stimulating ways to reduce exposure and risk to patients while maintaining proper diagnostic and therapeutic management should have a high priority for all physicians.

Acknowledgments

We are grateful for the collaboration of all residents and nursery staff.

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The Role of Sympathetic Innervation and Sympathomimetics in Gastric Secretion In Vivo

DONAL F. MAGEE, M.D., PH.D.

Gastrointestinal physiology seems to be particularly liable to the whims and vagaries of fashion in research. But the sympathetic nervous system (unlike pepsin secretion, the antral inhibitory mechanisms, the relationship between pancreatic exocrine secretion and gastric secretion, and other unresolved though fashionable research targets of the past) is somewhat different in that there has never been much interest in it, although the sympathetic nerves supplying the upper gastrointestinal organs are obvious and numerous. In *Secretory Mechanisms of the Gastrointestinal Tract* by R. A. Gregory (1) the word *sympathetics* appears once in the index, in relation only to the pancreas. Heidenhain pouches are often referred to as "denervated," although they have intact sympathetic innervation, as though only the vagal is of any consequence.

Heidenhain pouch responsiveness is variable among dogs, even when sham feeding makes it evident that vagal denervation is complete, but it has rarely been suggested that this variability may be caused by the sympathetic innervation. Certainty of a hormonal mechanism for gastric secretion required a gastric mucosa completely devoid of stimulating nerves. The classical proof requires absence of any nerves, but here again, no one considered the adrenergics. Instead, attention was directed to vagal fibers that could reach the pouch via the celiac ganglion and mesenteric attachments. To get around this difficulty, Ivy and Farrell (2) autotransplanted fundic pouches under the abdominal skin and at a later date divided the vascular pedicle. These pouches were much less responsive than those left in situ. Feng et al (3) had similar findings in fed dogs with pouches transplanted into the neck, which showed prompt acid secretion following food. Moll and Flint (4), Oberhelman et al (5), and Schafer and Kittle (6) noted that sympathectomy increased acid secretion. Gregory and Tracy (7, 8) denervated pouches in situ (modified Bickel's pouch) and also were able to show a prompt response to feeding in all of their animals. This was in contrast to the erratic response of animals with Heidenhain pouches, three of which did not respond to feeding at all.

What has been said about the fundic pouch applies with even more force to antral pouches: denervation means vagal. The usual denervated separated antral pouch is devoid of both branches of the autonomic nervous system, and the innervated pouch has both branches, but with very few exceptions, investigators have been unconcerned about the sympathetics.

Neither sympathetic stimulation nor extirpation has been much studied. Babkin summarizes the older work in his book (9). He and his associates found that splanchnic stimulation produced a small mucous secretion, alkaline in reaction and of low peptic activity. The antrum was held to be the major source of this. The same group has also claimed paralytic secretion (secretion following denervation) of much the same composition as that which followed splanchnic stimulation. This had been seen by others. Babkin was unable to confirm Bickel's (10) claim of an increase in acid secretion, but Hess and Faltitschek (11) had claimed increases in gastric acid in humans following paravertebral injection

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of novocaine at the 7th and 8th spinal segments. The same investigators found that ergotamine lowered gastric acidity in humans (12).

More recently, a few studies have been done with 5-OH dopamine, which destroys sympathetic endings (13). Grabner et al (14) and Larson and Sullivan (15) compared this with surgical sympathectomy in conscious dogs with gastric fistulae, and both increased the responsiveness to pentagastrin; pepsin was not studied. Hollinshead et al (16) reported that after sympathectomy by their new technique, the acid responses to histamine and the cephalic insulin response were augmented, but acid secretion following food was depressed. Propranolol raised acid before and after sympathectomy in every case, which suggests that the sympathetic denervation was not complete. Stellate ganglionectomy was found by Larson and Sullivan (15) to raise the acid response to pentagastrin from gastric fistulae, but basal and food stimulation was unchanged. Larson et al (20) found, in addition, that both sympathectomy and 6-OH dopamine, which causes chemical sympathectomy, raised basal and pentagastrin-stimulated secretion in conscious dogs. Yokatami and Osumi (17) found, in anesthetized rats, that splanchnic stimulation inhibited histamine and bethanecol stimulated acid. Since this effect was abolished by phentolamine, an α-adrenergic blocker, but was augmented by propranolol, they assumed it to be vascular and α in nature. The effects of splanchic stimulation were duplicated by norepinephrine. Blair et al (18) claimed that in anesthetized cats, sympathetic stimulation reduced acid secretion, mucosal blood flow, and serum gastrin when topical meat extract was the stimulus. Matsuo et al (19) found that sympathectomy raised serum gastrin in fed dogs.

Catecholamines

Studies on the actions of various catecholamines and their antagonists are more plentiful today than they were in the 1920s and 1930s, but are scarcely more conclusive. Babkin (9) again summarizes old work, which employed epinephrine almost exclusively. Prior to 1925 both increases and decreases in volume and acidity had been seen after intramuscular epinephrine in humans. Baxter (21, 22) gave huge doses intravenously at 5-min intervals to cats and dogs; resting mucus secretion was initially depressed, but it increased during the second 30 min after injection. The peptic power of this alkaline juice was greatly increased. Such large doses were given by these and earlier workers that it is difficult to conclude much from the data. The same results were obtained in frogs by Freidman (23), again with huge doses of epinephrine.

Modern work since the 1960s has shown that epinephrine and especially isoproterenol increase pepsinogen secretion from both innervated and denervated fundic mucosa (24, 25). Grecheskin (25) used histamine to get baseline secretion. Stimulation was prevented by β blockade. I have shown (26) that isoproterenol depresses pentagastrin-stimulated pepsin secretion from innervated gastric mucosa in conscious dogs, but augments methacholine-stimulated pepsin. There was no significant effect on pepsin from Heidenhain pouches. Both effects were abolished by propranolol (β blockade). We have reported (27) that both methoxamine and isoproterenol augmented pepsin secretion from innervated gastric mucosa stimulated with 2-deoxy-D-glucose. Heidenhain pouch pepsin was depressed by isoproterenol but unchanged by methoxamine (27). The doses used were methoxamine, 6 μg/kg/hr, and isoproterenol, 0.75 μg/kg/hr, both intravenously. In 1976 Hooper et al (28) found in anesthetized cats that the increase in pepsin secretion produced by vagal stimulation could be abolished along with acid and mucus secretion by simultaneous sympathetic stimulation. In recent times the action of sympathetic stimulation or ablation on pepsin secretion has been virtually uninvestigated.

Recently, two groups have been interested and active in this field. The names associated with the older one are the late Pamela Holton and B. P. Curwain; with the more recent one, C. Hovendal, F. Gottrup, and K. Bech. The orthodox views of the more recent group are summarized in a recent paper by Stevens et al (29), who found that two agonists, isoproterenol β_1 and β_2, and terbutaline β_2 depressed gastric acid secretion more strongly when pentagastrin was the stimulant than when histamine or bethanecol was used to stimulate gastric secretion. These authors concluded, in conformity with Gottrup et al (30–32), that β_2 receptors are the more important. This paper examines and dismisses the hypothesis that somatostatin is the mediator. The introduction states that the action of the adrenergic system on gastric secretion is poorly understood, but that others have noted that β_2 adrenergics reduce pentagastrin and, less potently, bethanecol and histamine stimulated acid secretion in conscious dogs.

Much of this work has been assembled in a recent symposium (33). The results reported

TABLE 1
References Cited in Text for the Action of Adrenergic Mechanisms on Acid Secretion

	Conscious		Anesthetized	
	Up	Down	Up	Down
Sympathetic regulation				
Rats				17
Dogs	10			
Cats				18
Sympathetic actions				
Dogs	4–6, 10, 13–16, 20	16*		
Humans	11	12		
Epinephrine				
Dogs	21–22	21, 22, 39	47	47
Humans	46	46		
Frogs	23			
α Adrenergics				
Rats	34			17
Dogs	27	39		17
β Adrenergics				
Rats		34	34, 17	
Dogs	26, 27, 36, 42–45, 49	25, 29–32, 35, 36, 39–41, 47, 49		
α Adrenergic blockade				17
β Blockade	16, 37, 38, 49	49		

* After feeding.

therein are almost uniform—except for those of Canfield and Price (34), who, although they agree with the majority in studies on conscious rats, found the opposite in isolated rat stomachs, wherein isoproterenol, salmefamol, and salbutamol all stimulated acid secretion. They felt that the inhibitory effect seen in vivo was indirect. Hovendal et al (35) favor β_1 receptors and argue that the inhibition is competitive against pentagastrin, but not against bethanecol. Indeed, Hovendal et al (35) found that low doses of isoproterenol produced no effect at all against bethanecol; however, earlier studies by this laboratory (36) show an uncommented-on clear increase in bethanecol-stimulated acid secretion with low doses of isoproterenol. Their results show that dopamine also, at low doses, produced dose-dependent stimulation of acid secretion. The same authors claimed that propranolol increased pentagastrin-stimulated acid from innervated dogs' stomachs (others have also seen this) (37, 38). Practolol had no effect. In vagotomized dogs, propranolol raised secretion to the prevagotomy level.

Apart from the work referred to above (36), there seems to be total agreement that β adrenergics depress fistula acid and pepsin, when it has been studied in conscious animals, stimulated with either pentagastrin, cholinomimetics, or histamine secretion. This uniformity is superficial, in the case of cholinomimetics and histamine, and results from selective citation of older works. Evident β stimulation of the heart in conscious dogs occurred (26, 27) with an intravenous isoproterenol dose of 0.75 μg/kg/hr, which clearly augmented methacholine-stimulated acid secretion. Stevens et al (29) used 12 μg/kg/hr intravenously. Hovendal and Bech (36) found inhibition of bethanecol-stimulated acid secretion at 6 and 9 μg/kg/hr intravenously and stimulation of acid secretion at 1.8 μg/kg/hr, although, as stated above, they do not mention it. Another concern in interpreting the results with bethanecol is the use of doses of acid stimulants that produce maximal or near-maximal stimulation (29). This rules out potential for augmentation.

Earlier results, for example those of Pradhan and Wingate (39), showed inhibition of histamine- and bethanecol-stimulated acid in conscious dogs with 75 μg/kg subcutaneously of isoproterenol, epinephrine, and norepinephrine. Many confirmed this with intravenous doses of 60–160 μg/kg/hr of isoproterenol (25, 40, 41). In humans, similar results were obtained with epinephrine (1 mg subcutaneously); data had shown, however, that catecholamines did not depress histamine-stimulated gastric acid secretion, but actually raised it (42–44). Holton (45), puzzled by this, gave conscious dogs small doses of isoproterenol and showed an enhancement of histamine-stimulated acid secretion. This has been reported in humans with epinephrine (46). Pentagastrin and meal-stimulated secretion were inhibited by isoproterenol, but large doses inhibited histamine, as had been previously reported. In anesthetized animals, Thompson and Vane (47) noted that epinephrine (10 μg/min intravenously) inhibited histamine-stimulated secretion and small doses augmented it (2 μg/min); the effect on pentagastrin stimulation was always inhibitory. In 1972, Magee et al (49) found that although isoproterenol depressed pentagastrin-stimulated acid and pepsin secretion, it did not do so when methacholine was the stimulus, and with methacholine, propranolol depressed secretion. Propranolol reversed the depression of pentagastrin-stimulated secretion. In 1981, Etzel et al (27) demonstrated that both methoxamine (an α adrenergic agent) and isoproterenol augmented cephalic secretion (2-DG stimulated) of both acid and pepsin. The dose of isoproterenol used in these experiments did not exceed 0.75 μg/kg/hr intravenously, and the dose of methoxamine did not exceed 6 μg/kg/hr intravenously. In subsequent unpublished experiments we have consistently found that isoproterenol, at this dose, raised the level of methacholine-stimulated acid and pepsin secretion from both vagally innervated and denervated gastric mucosa and did not raise plasma gastrin levels. The major part of this acid response occurs because isoproterenol causes sustained acid secretion after methacholine, whereas Gray and Ivy (48) and my group (49) have shown that unmodified response to cholinomimetics is a peak followed by a rapid falloff.

The Effect of Dopamine. What is the effect of β adrenergics on cholinergically stimulated and histamine-stimulated secretion? (See Table 1.) If this effect is different from that on pentagastrin, does this throw light on receptors or on the histamine intermediary hypothesis? Similar difficulty has been found with dopamine; Hovendal et al (35) claim that intravenous doses of 1, 5, and 10 μg/kg/min stimulated bethanecol-stimulated secretion, but 40 μg/kg/min intravenously inhibited both bethanecol- and pentagastrin-stimulated secretion. Guldvoog et al (50) state that doses of dopamine from 1 to 40 μg/kg/min inhibit acid and pepsin from innervated pouches in fed dogs. In our hands, dopamine, 10 μg/kg/min, depressed pentagastrin, methacholine, and pilocarpine secretion from both innervated and denervated mucosa, but had no effect on histamine-stimulated secretion from either (51).

Are Catecholamines Gastrin Liberators? The first suggestion that catecholamines could be gastrin liberators came from Hayes et al (52), who found elevated levels in two patients with pheochromocytomas and further studied the effect of epinephrine in anesthetized dogs. Stadil and Rehfeld (53) repeated the experiments in humans, giving doses from 0, 5, 25, to 75 ng of epinephrine kg/min by intravenous infusion for 10 min. Some subjects were given doses up to 150 ng. Serum gastrin levels rose and acid secretion rose significantly, promptly, and briefly. β blockade suppressed both, and the large epinephrine dose lowered gastrin levels. Christensen and Stadil (54) used epinephrine and norepinephrine in humans. Epinephrine in low doses (5 ng/kg/min) intravenously raised plasma gastrin and stimulated acid secretion. High doses (50 ng/kg/min) intravenously raised plasma gastrin substantially but did not stimulate acid secretion. The high dose of norepinephrine inhibited acid secretion and did not raise gastrin. Low doses of norepinephrine caused only a very small increase in gastrin. In view of what has been said above, this is in accord with those who have used small doses of catecholamines. In 1975, however, Blair et al (18), working on anesthetized cats, found that splanchnic nerve stimulation lowered gastric acid, serum gastrin, and mucosal blood flow. Meat extract applied to the antral mucosa was the stimulus. Others (19) found that splanchnicectomy increased serum gastrin responses to feeding in dogs. Swierczek et al (55) found that terbutaline, a β_2 agonist, depressed food-stimulated acid secretion from Heidenhain pouches, but increased plasma gastrin; both were blocked by propranolol. The gastrin release seemed not to be dose related. (See Table 2.)

TABLE 2
References Cited in Text for Action of Adrenergic Mechanisms on Gastrin Release

	In vivo blood levels		In vitro blood levels	
	Up	No change	Down	Up
Sympathetic stimulation, cats			18	
Sympathectomy	19			
Epinephrine	52–54	54		
Norepinephrine		54		
β adrenergics	55*, 35	57 63	31	60, 61
β blockers	53*	57 59*	53* 56*	

* Humans.

There have been many studies on catecholamine antagonist effects following the Hollander test (insulin hypoglycemia), prompted by the finding that even after vagotomy, insulin hypoglycemia provokes elevated gastrin levels. A possible explanation for this unexpected rise in gastrin is the rise in blood catecholamines that accompanies hypoglycemia. Gottrup et al (31) were able to block the raised gastrin and fistula acid secretion from dogs following both insulin and 2-DG with salmefamol, a β_2 agonist. The action on plasma gastrin following feeding was equivocal, but Christensen and Stadil (56) were able to block the gastrin increase in humans to hypoglycemia with β antagonists. Fielding et al (57) saw no alteration, with salbutamol, in the normal gastrin elevation over a 2-hr period, in humans following an English breakfast. Christensen and Stadil (54) (see above) have claimed that small doses of epinephrine raised both plasma gastrin and acid secretion in fasted humans. Large doses raised gastrin but did not affect acid. Norepinephrine had virtually no effect.

Jarhult et al (58) investigated the problem in 13 human volunteers, 5 of whom had previously been adrenalectomized. Insulin increased plasma epinephrine in the 8 normals, but in only three of those was gastrin elevated. These were the 3 with a very large rise in plasma epinephrine. Acid secretion was equally increased in both groups. The investigators have concluded that epinephrine can raise gastrin levels, but only when its concentrations are unphysiologically high.

In humans, again, Graffner and Jarhult (59) found that peak acid secretion following modified sham feeding was unchanged by β blockade, but basal secretion and plasma gastrin were lowered. Gastrin is stated to be raised by modified sham feeding after β blockade but not without it. The rise is not very evident from their figures. They concluded that β blockade, in contrast to its action in insulin hypoglycemia, does not modify either the acid or the gastrin responses to sham feeding, thus throwing considerable doubt on sympathetic mediation of gastrin secretion under physiologic circumstances in humans.

Several groups have claimed that β-adrenergic agonists cause gastrin release from in situ rat stomach (60, 61). In the former, gastrin-releasing polypeptide is thought to be an obligatory intermediate. In the latter, somatostatin is suggested as an intermediate in the depression of acid by isoproterenol, but not in the elevation of gastrin. We (37) and Debas et al (62) have shown that antral factors modify the responsiveness of the secreting mucosa, and vice versa. Our contention has been that the mediation is adrenergic. Antral mucosal cooling does not raise the acid response of the fundus to pentagastrin if a β or ganglionic blocker has been given first, and by implication, it is argued that isoproterenol and similar agents raise plasma gastrin only as a consequence of depressed fundic responsiveness. We (63) have been unable to show an increase in plasma gastrin with isoproterenol even during augmentation of methacholine-stimulated acid secretion. Debas et al (62) were able to increase serum gastrin by distending an innervated fundic pouch. They did not use any blocking drugs, and their results are possibly at variance with the above implication, since acid secretion did increase in the distended innervated pouch.

Summary

It can, I believe, be argued in summary that pentagastrin-stimulated acid and pepsin secretion from innervated or denervated fundic mucosa is inhibited by doses of epinephrine and isoproterenol that produce an unequivocal cardiac stimulation, but this cannot be said of either histamine-, bethanecol-, or methacholine-, or food-stimulated secretion. There is substantial old evidence that epinephrine and isoproterenol, in doses that depress the pentagastrin effect, actually augment that of histamine and cholinomimetics. Large doses, of course, inhibit unequivocally. Sympathectomy, chemical or surgical, seems to increase the responsiveness of the fundus to acid stimuli, but again there is little uniformity; both less acid following feeding, after sympathectomy, and more following propranolol have been reported (11). It would be rash to draw any conclusions from the action of either sympathetic stimulation or ablation.

The evidence that β-adrenergic blocking agents can prevent insulin-stimulated increases in gastrin is fairly good, but the evidence that these agents have any effect on food-stimulated gastrin levels (whether the food is a meal or sham) is not good. Almost every aspect of this subject remains confused and confusing.

At the end of a paper such as this, most readers would expect conclusions, but any conclusions other than those given above would be invention or else bias. This subject, at present unfashionable for research, represents a black hole in our knowledge. Confusion has resulted from failure to interpret results from conscious and acute preparations separately, in the former also from failure to recognize that the basal state is a regularly fluctuating control, and finally from the rush to study modern complicated synthetic catecholamines, before we know anything about the nerves and the naturally occurring neurohormones in physiologic concentrations.

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Cardiopulmonary Resuscitation:

Qualifications and Performance of Housestaff and Trained Internists

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Abstract

Eighty-six physicians in the Internal Medicine Department of the Mount Sinai Medical Center were evaluated on attitudes and knowledge of basic and advanced cardiac life support. Information was gathered over a one-week period using a self-administered questionnaire. Eighteen (21%) of the respondents did not know of the availability of basic and advanced cardiac life support courses at this institution. Of the physicians who had never taken either course, 8 (25%) stated it was because it was not offered at a convenient time or place. All housestaff officers were noted to have completed both courses, a percentage much higher than that of the trained internists ($p < .0001$). Previous formal training in cardiac life support was found to be associated with a higher level of confidence in the ability to administer cardiac lifesaving techniques ($p < .0001$) and a higher overall knowledge score ($p = .003$).

We determined that the housestaff officers in internal medicine were the physicians most qualified to perform resuscitation efforts because of their completion of life support courses, their confidence in administering these techniques, and their greater overall knowledge. Wider publicity on the availability of cardiac life support courses, more convenient scheduling of such courses, and mandatory certification in basic life support for all physicians, with additional certification in advanced cardiac life support for physicians with extensive ward responsibility, are needed.

"Is there a doctor in the house?" A classic line from countless movies. Implicit in this question is the belief that with the arrival of a physician will come the medical knowledge needed to handle an emergency situation. Many life-threatening emergencies involve either cardiac or respiratory arrest, the primary goal of a rescuer being to maintain respiratory and cardiac integrity by rendering basic life support. Basic life support (BLS) is defined as the phase of emergency cardiac care that prevents circulatory or respiratory arrest or insufficiency through prompt recognition and intervention by external support (cardiopulmonary resuscitation). Advanced cardiac life support (ACLS) includes all the measures of basic life support plus the use of adjunctive equipment to support ventilation, the placement of an intravenous line, drug administration, cardiac monitoring, defibrillation, control of arrhythmias, and postresuscitative care (1).

In light of recent public focus on maintaining quality assurance in hospitals, we investigated whether physicians were adequately prepared to deliver cardiac life support. In view of the statement in the New York State Ad Hoc Advisory Committee on Emergency Services report that the intent was to "increase the responsibility of the attending physicians in the supervision of residents" (2), we decided to evaluate which physicians were best prepared to handle cardiopulmonary arrest situations. Our goals were fourfold: first, to document the demographics of the

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Data for this study were obtained by the first and second authors during a third-year clerkship in the Department of Community Medicine at Mount Sinai School of Medicine (CUNY).

TABLE 1
Relationship between Level of Training and Scores on Knowledge Tests (% Correct ± 1 SD)

Level	N	Grade BLS	Grade ACLS	Overall
Internists	54	54 ± 20	60 ± 22	57 ± 16
Interns	20	77 ± 12	72 ± 14	75 ± 9
Residents	12	69 ± 17	82 ± 14	76 ± 11
Significance (*p*)				
Internists vs. interns		**	*	**
Internists vs. residents		*	**	**
Interns vs. residents		NS	NS	NS

* = $p < .05$.
** = $p < .0005$.
NS, not significant.

medical staff with regard to their certification in life support; second, to determine the attitudes of physicians toward training in life support; third, to gauge interest in learning life support methods and ways to make it more convenient for physicians to attend the courses; fourth, to test the physicians' actual knowledge of life support techniques.

Methods

A self-administered questionnaire was distributed to staff of the Department of Internal Medicine of the Mount Sinai Medical Center over a one-week period. Information was recorded on sex, age, year of medical school graduation, and year of completion of residency program. If respondents indicated that they were medical housestaff, the level of training (PGY1, PGY2, PGY3) was recorded. Other data collected included whether the physician had ever taken a course in either basic or advanced cardiac life support, and if so, the year of course completion. Those who had taken a course were asked whether they were currently certified, and if not, the reason why certification was not obtained.

Participants were also asked to state: (1) whether they had used either basic or advanced cardiac life support in the past year; (2) whether they felt qualified to administer life support; and (3) whether as physicians they felt they should know basic or advanced cardiac life support, and if not, why they felt the knowledge was not required. Additionally, they were questioned as to whether they knew that courses were offered at the Mount Sinai Medical Center, whether they were interested in taking the courses, and what was the most convenient time to offer the courses to maximize attendance.

Actual knowledge of life support techniques was evaluated using 15 multiple-choice questions, 7 on basic life support and 8 on advanced cardiac life support. The 7 "basic" questions were supplied by the 1986 cardiopulmonary resuscitation (CPR) textbook (3) and the 8 "advanced" questions were derived from the 1983 American Heart Association's *Textbook of Advanced Cardiac Life Support* (4), with updates from the 1986 *Standards and Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiac Care* (1). A criterion for selection was that the question had to reflect key areas of knowledge required for the correct performance of either basic or advanced cardiac life support. Approval was then obtained from a cardiologist specializing in arrhythmia management who is also involved in BLS and ACLS instruction.

The study population consisted of 20 PGY1 (interns), 12 PGY2 and PGY3 (residents), and 54 attendings and fellows (trained internists). The interns were clustered together because they had completed courses in both BLS and ACLS as mandated by The Mount Sinai Hospital policy to begin their internship. The residents were grouped together because although it had been a few years since their initial cardiac life support training, they had extensive ward experience and were the physicians primarily responsible for the proper execution of resuscitation efforts. The trained internists were a separate group because they had limited contact with the inpatient services and thus decreased exposure to cardiac arrest situations.

Statistical significance was calculated using chi-square, Student's *t*-test, and Fisher's exact test. Level of significance was set at $p < 0.05$ for *t*-test and chi-square.

Results

The results on the knowledge portion of our study revealed a significant difference between the overall performance (BLS and ACLS) of the trained internists and the performance of the housestaff (both interns and residents). The mean score of the trained internists was significantly lower than the scores for the interns and residents ($p = .0001$ for both interns' and residents' scores). Further evaluation of the BLS scores showed a significant difference among trained internists' scores and the scores of interns and residents ($p = .0001$ and $p = .0149$, respectively). Upon analysis of the ACLS scores, the mean

TABLE 2

Relationship between Level of Training and Attitudes toward Life Support Techniques

	Have taken course	Have used	Qualified for	Feel should know
Basic life support				
Internists	34 (63%)	13 (24%)	42 (78%)	50 (93%)
Interns	20 (100%)	20 (100%)	20 (100%)	20 (100%)
Residents	12 (100%)	12 (100%)	12 (100%)	12 (100%)
Significance (*p*)	**	**	*	NS
Advanced cardiac life support				
Internists	18 (34%)	17 (31%)	29 (55%)	43 (80%)
Interns	20 (100%)	17 (85%)	11 (55%)	20 (100%)
Residents	12 (100%)	12 (100%)	11 (92%)	12 (100%)
Significance (*p*)	**	**	*	*

* = $p < .05$.
** = $p < .0005$.
NS, not significant.

score of the trained internists was significantly different from the mean score of the interns and of the residents ($p = .0080$ and $p = .0002$, respectively). No significant difference, however, was noted between the interns and residents in overall, BLS, and ACLS scores ($p = .8071$, $p = .1645$, and $p = .0617$, respectively) (Table 1).

All of the housestaff officers claimed to have taken BLS and ACLS, a significantly higher percentage than that of the trained internists who acknowledged having been formally trained ($p < = .0001$ for both BLS and ACLS) (Table 2). Of the 32 trained internists who had not taken either BLS or ACLS, 8 (25%) stated the course was not offered at a convenient time or place, 11 (34%) felt the course was unnecessary, 9 (28%) cited time constraints, and 4 (13%) offered other reasons. As expected, all the housestaff officers acknowledged having used BLS in the past year, and the majority of the interns and all the residents acknowledged having used ACLS. These percentages were significantly higher than those of the trained internists ($p < .0001$ for both). All housestaff members felt qualified to deliver BLS. This was significantly higher than the percentage of the trained internists who felt confident in their ability ($p = 0.02$). In contrast, not all of the housestaff (approximately half of the interns and 8% of the residents) felt qualified to administer ACLS. When compared to the confidence level of the trained internists, this difference had only borderline significance ($p = .05$) (Table 2).

All of the housestaff officers felt that it was important to know BLS and ACLS, whereas the trained internists did not agree unanimously (Table 2). The reasons stated by those internists who felt the knowledge of the techniques was not important included (a) lack of benefit to their practice ($n = 1$); (b) lack of exposure to cardiac arrest victims ($n = 4$); (c) opinion that such knowledge was intended for cardiologists and critical care specialists ($n = 1$); and (d) other, unstated reasons ($n = 1$).

In our study, the majority of physicians had taken a course in BLS. This previous training was significantly associated with level of confidence in administering BLS ($p < .0001$), recognition of the physician's need to know BLS ($p = .002$), and use of BLS in the past year ($p < .0001$). The grade in BLS was also significantly associated with previous BLS training ($p = .0001$). Of the 20 physicians who had never taken a BLS course, half felt qualified to administer it, some had used it in the past year, and most felt they should know it (Table 3).

Two-thirds of the physicians had taken a course in ACLS. Previous training again was significantly associated with confidence in administering ACLS ($p < .0001$), recognition of the need to know ACLS ($p < .0001$), and use of ACLS in the past year ($p < .0001$). The mean grade in ACLS was also associated with previous ACLS training ($p = .0001$). Of the 35 physicians who had never taken an ACLS course, one-third felt qualified to administer ACLS, some had used it in the past year, and again, most felt a physician should know it (Table 3).

The majority of the physicians surveyed knew that BLS and ACLS were offered at Mount Sinai. More than half were interested in taking a BLS course, and almost two-thirds were interested in an ACLS program. Among those who did not previously know of the availability of such courses, the interest was even higher (Table 4). When asked about the ideal time to schedule the

TABLE 3
Attitudes and Grades in Life Support Techniques as They Relate to Training

	Feel qualified	Should know	Have used	Grade BLS (% correct ± 1 SD)
BLS				
Yes ($n = 66$)	64 (97%)	66 (100%)	43 (65%)	66 ± 19
No ($n = 20$)	10 (50%)	16 (80%)	2 (10%)	46 ± 16
Significance (p)	.0005	.05	.0005	.0005
ACLS				
Yes ($n = 51$)	39 (76%)	49 (96%)	42 (82%)	74 ± 18
No ($n = 35$)	12 (34%)	25 (71%)	4 (11%)	55 ± 20
Significance (p)	.0005	NS	.0005	.0005

NS = not significant.

training sessions, 62 physicians responded. Trained internists, interns, and residents all felt daytime hours were the best (54%, 36%, and 40%, respectively), followed by evenings (27%, 27%, and 40%, respectively), and then weekends (7%, 18%, and 0%, respectively). The rest answered with combinations of choices.

Discussion

In 1966, six years after the technique of closed-chest massage was first introduced (5), the first conference on CPR recommended that all medical, allied health, and other professional personnel be trained in CPR, reflecting the standards established by the American Heart Association (6). Acceptance of the theories of closed-chest resuscitation by physicians grew, and in 1973, at the second national conference, CPR training of the general public was recommended (7). Since that time it has been shown repeatedly that early initiation of basic and advanced life support by the lay population as well as medical personnel has proved invaluable (8–13). These results apply to cardiopulmonary arrest situations both in and out of the hospital; thus, it is inherently obvious that there is a need to train all medical personnel in these techniques.

In 1978 the Joint Commission on Accreditation of Hospitals (JCAH) required that all hospital staff physicians receive training in CPR. Hospitals set up physician CPR programs to meet the requirements and assure accreditation. As a result, the number of physicians certified increased from previous years (14). However, despite continued recommendation from the national conference, the JCAH announced in 1980 it would no longer enforce the requirement (15, 16). The reasoning behind the decision was that most physicians seldom perform resuscitation regularly, and those frequently using CPR would seek training on their own. A subsequent decline in physician certification as well as in competency in the techniques followed this JCAH ruling (14, 17–21).

TABLE 4
Interest in Life Support Training Courses

Knew courses offered	N	Interest in taking BLS	Interest in taking ACLS
Yes	68	37 (54%)	42 (62%)
No	16	10 (62%)	11 (69%)
		NS	NS

NS, not significant.

Despite the withdrawal of the JCAH requirement, the Mount Sinai Medical Center has recognized the importance of basic and advanced cardiac life support and has thus required that all housestaff officers of the Internal Medicine Department be trained in both techniques before they begin service on the wards. No such requirements for trained internists exists. Thus, in dividing our population into trained internists, interns, and residents, we expected to find that the interns would perform the best in the knowledge tests since they have recently completed both courses. We also expected to find that the residents would excel in their knowledge of cardiac life support, particularly ACLS, since they were the medical staff members expected to perform the resuscitation attempts using ACLS techniques.

Upon analysis of the data we did find that the housestaff performed significantly better than trained internists in overall knowledge scores; however, there was no significant difference between the interns' and residents' scores when compared by overall knowledge of either BLS or ACLS. A trend in the scores, however, suggested that the interns tended to be better prepared in BLS and the residents in ACLS. These results, which would possibly become significant with a larger population, perhaps reflected the interns' knowledge resulting from recent certification in BLS and ACLS versus the value of hands-on experience of the residents in the administration of ACLS techniques.

The trained internists performed poorly compared to both interns and residents in the overall knowledge tests. Also, significantly fewer trained internists than housestaff had been trained in cardiac life support, and previous training did significantly affect performance on the test. Since many trained internists had never been formally taught cardiac life support by the current guidelines, and even more had not recently used the techniques, it was not surprising that their scores in BLS and ACLS and overall grade reflected this lack of exposure and practice.

All residents had used BLS and ACLS in the preceding year, and the majority felt qualified to perform them both. In contrast, although virtually all interns had used BLS and ACLS, 20 (100%) felt qualified in BLS, but only 11 (55%) felt qualified in ACLS. This lack of confidence could be the result of limited floor experience and responsibility in handling cardiopulmonary arrest situations and indicated to us a need for more extensive training and practice sessions to instill confidence. Of the trained internists, 13 (24%) had used BLS and 17 (31%) ACLS; 42 (78%) felt qualified to administer BLS and 29 (55%) ACLS. These findings were attributed to the decreased formal training of the trained internists in BLS and ACLS and the fact that these physicians may not be present on the medical services long enough to encounter the situations that would require their personal response to a cardiac arrest.

Almost all physicians in the Internal Medicine Department felt knowledge of BLS and ACLS was important, yet only 66 (77%) had taken the BLS course and 51 (59%) an ACLS training program. In addition, the fact that both BLS and ACLS were offered at Mount Sinai was not known by 16 (19%) of the physicians surveyed. Of this group, 10 (62%) expressed an interest in taking BLS and 11 (69%) ACLS. This indicated a need for increased publicity to the internal medicine community at this institution on the availability of life support training programs. The time recommended most often for scheduling such programs was during the day—that is, in lieu of Grand Rounds, Morbidity and Mortality Conferences, or other departmental meetings.

Thus, formal training markedly improved physicians' confidence level in the administration of cardiac life support techniques as well as their overall knowledge in the subject area. From our study of the Internal Medicine Department of the Mount Sinai Medical Center, the physicians most qualified to handle a cardiopulmonary arrest were the housestaff officers.

Based on these results and the vast amount of literature promoting the importance of the early initiation of CPR to restore sudden-death patients, we recommend that all internal medicine physicians, both housestaff and trained internists, be required to complete a BLS course, with mandatory recertification every two years. Furthermore, all physicians with extensive ward responsibilities should be required to complete both BLS and ACLS courses, with mandatory recertification every two years. This recommendation concurs with that of the New York State Ad Hoc Advisory Committee, which advocates increased responsibility of the attending physicians in supervision of housestaff (2).

Our findings also indicate a definite interest among all internists in becoming certified, and thus, we suggest that cardiac life support courses be widely publicized and offered at more convenient times to maximize attendance and best suit physicians' needs and schedules.

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Peripartum Cardiomyopathy

A Role for Cardiac Stress Determinants Other than Pregnancy?

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Abstract

Peripartum cardiomyopathy is a syndrome of undetermined etiology whose most common initial symptoms are those of congestive heart failure. The syndrome carries a five-year mortality estimated at 40%. Single noxious factors, such as viral infection, have been proposed as direct precipitants of this syndrome, but none have been conclusively linked to it. The cases of two patients with identifiable cardiac stress factors who developed peripartum cardiomyopathy are presented here: one with sepsis complicated by disseminated intravascular coagulopathy and severe anemia, and a second with an otherwise normal pregnancy who engaged in strenuous aerobic exercise throughout the last trimester. A review of previously published cases reveals the frequent association of multiple nonspecific cardiac stress factors that may predispose women to peripartum cardiomyopathy. Various cardiac stress factors may act synergistically with the stress of pregnancy to precipitate peripartum cardiomyopathy in susceptible women.

Peripartum cardiomyopathy (PPCM) is a well-documented clinical entity of still undetermined etiology although it was first described by Ritchie (1) more than 100 years ago. Criteria for diagnosis include the development of heart failure in the last month of pregnancy, or within the first five postpartum months. In addition, the diagnosis requires an absence of demonstrable heart disease prior to the last month of pregnancy and no discernible etiology at the time of the onset of symptoms (2, 3). The disease has interesting demographic and geographic variations in incidence and prognosis (3–5) and a variable clinical presentation (2, 6–8). Numerous etiologies have been proposed (5, 6), and there is no efficacious medical theray (2, 4, 6, 9).

Two cases are reported here: we recently observed a patient in whom toxemia of pregnancy, sepsis, and disseminated intravascular coagulopathy preceded the overt development of PPCM, and another who had PPCM without obvious evidence of associated systemic stress and who actively engaged in strenuous physical activity until the week of admission. We reviewed other published data for associated cardiac stress factors that, in addition to the demands of pregnancy, may predispose susceptible women to this syndrome.

Case Reports

Case 1. A 17-year-old Hispanic woman with one child was admitted to the hospital in active labor with a full-term intrauterine pregnancy. The patient's prenatal course, confirmed by regular prenatal clinic visits, had been uncomplicated. On admission she was found to be preeclamptic, with a blood pressure of 140/90 mmHg, and 2+ proteinuria. She underwent a normal spontaneous vaginal delivery.

Immediately postpartum she was found to have a fever of 103°F with symptoms of dysuria and urinary frequency. The white blood cell count was 11,000 cells/cu mm with 15% band forms. Urinalysis revealed 10 white blood cells and bacteria per unspun high-power field; gram-

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negative rods were noted on Gram's stain. The patient's fever persisted despite antimicrobial therapy. Nine days after admission, her course was further complicated by disseminated intravascular coagulation. The hemoglobin fell to 58 g/L (normal, 120–150 g/L) and she required five units of packed red blood cells prior to stabilization.

Pelvic ultrasound delineated an 8 × 10 cm right perivaginal mass which was subsequently drained of 1000 cc of blood. On the 10th day, she noted increasing shortness of breath and complained of chest pain. On examination the patient was found to be tachypneic, with a respiratory rate of 26/min, blood pressure of 130/80 mmHg, pulse 110 beats/min, and temperature 102°F. Auscultation revealed bilateral moist rales and an S_3 gallop. No jugular venous distention or peripheral edema were noted. Chest x-ray revealed borderline cardiac enlargement and pulmonary vascular congestion with interstitial edema. Electrocardiography revealed sinus tachycardia, right axis deviation, and nonspecific ST-T wave changes. A lung scan was nondiagnostic. The patient received digitalis and was anticoagulated with heparin and transferred to an intensive care unit. Radionuclide gated blood pool imaging demonstrated biventricular enlargement, severe diffuse biventricular dysfunction, a left ventricular ejection fraction of 28% (normal ≥ 45%), a right ventricular ejection fraction of 23% (normal ≥ 40%), and a right ventricular apical filling defect consistent with intracavitary thrombus. An echocardiogram revealed diffuse left ventricular hypokinesis and confirmed the presence of a right ventricular apical thrombus.

Subsequently the patient progressively improved, although she left the hospital against medical advice nineteen days after admission, returning as an outpatient two days later. An echocardiogram now revealed mild septal kypokinesis with marked improvement in ventricular function. Gated blood pool imaging revealed marked improvement in left and right ventricular function, with ejection fractions of 58% and 38% respectively. The right ventricular thrombus was no longer present on either study. The patient continues to be followed up in clinic and remained asymptomatic 28 months after admission.

Case 2. A 33-year-old woman in her first pregnancy was admitted to the hospital one week prior to her expected day of delivery, with a five-day history of increasing shortness of breath. The patient's prenatal course had been uncomplicated, but was remarkable for a strenuous daily exercise routine. The patient was an avid long-distance runner who maintained this practice throughout her pregnancy and claimed that her exercise tolerance had remained normal. Five days prior to admission the patient began experiencing shortness of breath and on the morning of admission also complained of substernal chest pain.

On admission, her blood pressure was 120/80 mmHg, pulse 110 beats/min, respiratory rate 56/min, and temperature 99°F. Auscultation revealed moist rales bilaterally throughout the lower third of the lung fields, and an S_3 gallop. No jugular venous distension or peripheral edema were noted.

Chest x-ray revealed an enlarged cardiac silhouette with increased markings at both bases consistent with interstitial edema. The electrocardiogram showed sinus tachycardia, left anterior hemiblock, poor R-wave progression, and nonspecific ST-T wave changes. Arterial blood gas analysis revealed a pH of 7.4, PCO_2 of 26_{torr} and PO_2 of 36_{torr}. Other significant laboratory values included alkaline phosphatase 3.7 μkat/L (normal, 0.5–2.0 μkat/L), LDH 5.88 μkat/L (normal, 0.82–2.66 μkat/L) and uric acid 625 μmol/L (normal, 120–420 μmol/L). An echocardiogram revealed diffuse biventricular hypocontractility.

In the coronary care unit, Swan Ganz catheterization revealed a pulmonary capillary wedge pressure of 27 mm/Hg. The patient was treated with furosemide, digoxin, nitroglycerin, and oxygen by nasal cannula with a good response. On the third day of admission the patient underwent a spontaneous vaginal delivery, experincing significant shortness of breath and fatigue. The patient's postpartum course progressivly deteriorated. Two days postpartum, an echocardiogram revealed more severe left ventricular dysfunction. The patient remained severely short of breath and developed progressive renal and hepatic failure. The patient died on the twelfth day of admission, despite hemodialysis and continued therapy for congestive heart failure.

Discussion

PPCM is a myocardial disease of undetermined etiology presenting most commonly with signs and symptoms of biventricular failure in the last month of pregnancy or within the first five months postpartum. For purposes of diagnosis, the absence of heart disease must be demonstrated prior to the last month of pregnancy (2, 3). Characteristically the patient will experience

TABLE

Cumulative Studies of Women with Peripartum Cardiomyopathy Analyzing Potential Premorbid Cardiac Stress Factors

Study (ref. no.)	# Patients	No. of Pts with stress factor*				
		Hgb	Sepsis	Tox	Surg	Other
Walsh et al (7)	15	7	2	8	7	3†‡
Melvin et al (6)	3		3			1§
Weitz et al (8)	3	1	1		2	1§
Burch et al (9)	34	18	11	23	11	3§
Demakis et al (3)	27			6		
Davidson et al (4)	224	?	+	+ +		224‡,‖
Fillmore et al (10)	250	?	?	+ +		250‖

Hgb, anemia; Sepsis, infection; Surg, c/section or other major surgery; Tox, toxemia and/or hypertension + +, “common” finding; +, “uncommon” finding; ?, present but number unknown.

* Several studies did not specify individual patient characteristics or discuss risk factors in specific detail; thus these numbers may underestimate absolute number and variety of stress factors. Author’s comments (“common” or “uncommon”) are noted.

† Hemorrhage.

‡ Hypoalbumenemia.

§ Hypotension.

‖ Ritual of salt intake and hot baths.

shortness of breath, cough, and peripheral edema (2, 3, 9). Other symptoms include weakness, chest and abdominal pain, palpitations, and hemoptysis, in order of decreasing frequency (3, 9). A gallop rhythm and moist rales are the most frequent physical findings. Other signs include an accentuated P_2, hepatomegaly, jugular venous distention, and cardiac arrhythmias (2–4, 9). The pathological findings are relatively nonspecific (2, 6, 7). On gross examination the heart is flabby, with four chamber enlargement and, not uncommonly, mural thrombi. Histologically, the myocardium demonstrates degeneration or hypertrophy of muscle fibers, with scattered evidence of mononuclear cell infiltration, edema, and fibrosis. The findings are not significantly different from other forms of idiopathic dilated cardiomyopathy.

There are distinct geographical differences in the incidence of PPCM (5). The incidence ranges from approximately 0.005% of white deliveries (5) to as high as 1% of Hausa deliveries in Zaria, northern Nigeria (4, 5). In the United States, the disease is found in older multiparous black women with an incidence of about 0.1% (5), more commonly in the presence of twins and toxemia of pregnancy (2, 3). The incidence is higher in second and subsequent pregnancies (7, 9). Once PPCM has occurred, patients are more susceptible during additional pregnancies, despite apparent recovery and absence of symptoms in the interim.

Although the etiology of PPCM remains unknown, numerous hypotheses have been proposed. In Zarian women, the high incidence has been associated with the ritual consumption of large quantities of lake salt for 40 days postpartum while the woman remains confined to a small heated room and takes daily hot baths. One speculation is that the large volume load and increased cardiac workload imposed by heating and salt consumption are partly responsible for the subsequent cardiac failure (4, 5).

It is possible that an increased cardiac workload superimposed on the demands of pregnancy may be a common finding in many patients with PPCM irrespective of geography. During pregnancy the normal physiologic changes of the cardiovascular system result in an increase in cardiac workload. By the end of the second trimester blood volume will have increased by aproximately 50%, heart rate by 10%–15% and cardiac output by 30%–50%. Cardiac output further increases appreciably during the efforts of labor. Immediately postpartum there is an additional 30% increase in cardiac output as the uterus contracts and forces a large volume of blood into the circulation (11). In the first case presented here, toxemia, sepsis, and severe anemia were present. In our review of published clinical presentations (3, 4, 6–10), we noted that many additional systemic factors capable of producing increased cardiac workload are commonly associated with PPCM (Table). This increased workload may be due to either preload or afterload increases or other types of stress.

Cardiomegaly and abnormal ventricular function ultimately develop in diseases characterized by chronic pressure or volume overload (12), but only after many years. Although cardiac dysfunction developing in PPCM is not a chronic process, the higher incidences in second and subsequent pregnancies suggest an additive effect.

An exaggerated or prolonged adrenergic physiologic response secondary to prolonged stress may play an additional role in the development of cardiac dysfunction in this disease. Norepinephrine has been shown to have both trophic and toxic effects on the myocardium. It has been shown that adrenergic stimulation can induce myocardial hypertrophy and cell growth (13), while sustained circulating levels of catecholamines may cause direct myocardial damage (14). The urinary excretion of free catecholamines has been reported to increase by approximately 50% during pregnancy (15) and to rise further with exercise (16).

A sustained increase in cardiac workload appears to be a common denominator of many of the proposed etiologies of this syndrome. It is conceivable that the enhanced adrenergic response associated with the stress of pregnancy, prolonged labor, infection, or anemia contributes to the development of cardiac dysfunction in susceptible patients.

Inflammatory diseases have also been suggested as possible causes of PPCM (3, 6, 17). Pregnancy may be associated with an increased incidence of detectable echovirus and other viral infections (18). The more frequent occurrence of PPCM in multiparous women may in part reflect the greater incidence of viral infections when additional children are present in the family. Evidence of coxsackie virus B infection has occasionally been found in PPCM (6, 17), although the role of myocardial infection remains controversial (3, 8). Interestingly, arenavirus outbreaks causing ECG changes, bradycardia, hypotension, and pulmonary edema with high mortality rates have occurred specifically in northern Nigeria within 200 miles of Zaria. This viral agent was first discovered in 1969 as the cause of Lassa fever. Although not clearly associated with PPCM, it occurs more frequently in women and in one series, three of eight infected women were pregnant (19). It is possible that a heart rendered vulnerable by viral infection might be unable to handle the additional demands of pregnancy. Other factors that predispose to certain virus infections include alcohol, malnutrition, heat, and exercise (20). Susceptibility to infection may be enhanced by the immune depression accompanying these factors (21, 22). These factors may also increase cardiac stress through their direct effect on the cardiovascular system, contributing to cardiac dysfunction in susceptible patients.

It is not clear whether the continuation of vigorous exercise through the last trimester of pregnancy contributed to the development of PPCM in the second case presented here. However, in frequency and intensity the patient's exercise exceeded current recommendations (23). In a murine model, sustained strenuous exercise when combined with coxsackievirus infection was associated with depressed immune function, increased titers of myocardial virus and increased mortality (24). Although there was no evidence for recent viral infection in this patient, it is possible that mild or occult infection occurred. Documented information is scarce on the effect of sustained strenuous aerobic exercise or even moderate exercise on pregnant women with or without viral disorders (15). In light of this and the suggested similarities between human and murine myocarditis, it might be prudent to discourage exercise more strenuous than current guidelines (23) in pregnancy and particularly to discourage any exercise in the presence of a viral illness. Close adherence to current exercise guidelines (23), with physician guidance, will further permit the individualization of exercise programs to previous levels of activity.

The long-term prognosis in PPCM can be predicted by the rapidity with which the heart returns to its normal size (3). Within six months, approximately 50% of patients will have normal heart size and subsequently do well, whereas the remainder will show little improvement (2, 3). In the first case described, rapid improvement in the patient's symptoms in the first postpartum weeks was associated with echocardiographic and gated blood pool imaging confirmation of a return of the heart to normal size and near normal function. Approximately 85% of patients with persistently dilated hearts after six months will die of congestive failure; average survival is approximately five years (3). Thus, the overall mortality in American women is 30%–40%. The prognosis for Zarian women is much better, the mortality rate being 11% (5). This may reflect a difference in host resistance or in the severity and duration of the initiating stress cofactors. A controlled study is needed to clarify the role of different stresses in promoting PPCM and the role of stress amelioration as a therapeutic modality in this disease.

In view of the frequent association with the disease of recognizable cardiac stress factors apparent from the literature, vigorous attempts should be made to identify and reverse any such factors if and when they develop. The disease in Zarian women may be a prime example of "secondary" PPCM precipitated by identifiable exogenous stress that leads to a far better outcome once the stress is removed than the disease in women without identifiable underlying precipitants.

Although PPCM is an accepted, well described entity, it is indistinguishable from other "idiopathic" acute dilated cardiomyopathies. It does not differ significantly from other cardiomyopathies in histology (2, 6) and the prognosis may be similar as well. The clinical course of acute dilated cardiomyopathy is similar to that in PPCM and is largely dependent on subsequent improvement in left ventricular function, which is observed in approximately 40% of patients (25). It may not be unreasonable to theorize that for every clinically manifest case, numerous others of benign course and lesser severity go unrecognized. The stress of pregnancy may alter the clinical course in susceptible women, producing overt manifestations of disease. Thus, pregnancy may represent one of many possible nonspecific causes of increased cardiac workload that, in combination with other predisposing factors, may result in acute dilated cardiomyopathy.

There is no specific therapy for PPCM. Conventional treatment for congestive heart failure, including diuretics, ionotropes, vasodilators, and anticoagulants, are used as required (2–4). However, early identification and removal of extraneous causes of increased cardiac workload in pregnant women may contribute to the prevention or amelioration of PPCM. This remains to be tested in a controlled trial.

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Sonography in Early Pregnancy: The Significance of Subchorionic Hemorrhage

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Abstract

Among 31 pregnant women with first-trimester bleeding, all were found on sonographic study to have subchorionic hemorrhage with a living fetus. Twenty-six went on to normal term pregnancies. Two had premature labor at 31 and 32 weeks. Three had first-trimester missed abortions. No correlation was found between volume of subchorionic bleeding and prognosis. The prognosis of the pregnancy in this group of 31 women with first-trimester bleeding and sonographic evidence of subchorionic hemorrhage and fetal cardiac activity was 80% favorable.

The purpose of this clinical study was to determine the prognosis of subchorionic hemorrhage. Thirty-one patients were collected for the study, and subchorionic hemorrhage was found to be the cause of the vaginal bleeding in all, by sonographic study, which ruled out other conditions. In all the patients there was evidence of fetal cardiac activity, indicating a generally good prognosis.

Patients and Methods

All the patients were examined by various obstetricians in private practice. All 31 patients were in the first trimester of their pregnancy and had vaginal bleeding; five also complained of abdominal cramping. An ultrasound study was requested because of the first trimester bleeding.

The examination was performed with the patient's bladder distended using real-time sector scanning. Careful monitoring of the uterus was performed with visualization of a fetal pole and observation of fetal cardiac activity when possible. Size, extent, and position of the subchorionic hemorrhage were all noted.

Although follow-up sonographic study was requested in virtually every patient, only seven had repeat scans, two to twelve weeks after the initial diagnosis was made.

Results

There was evidence of fetal cardiac activity in all 31 initial ultrasound studies. Twenty-six of the thirty-one patients went on to normal full-term pregnancies. Two went into premature labor, at 31 and 32 weeks, and three had missed abortions in the first trimester.

The Apgar scores for the two premature infants were 6 and 7, respectively. The infants' course in the premature nursery was satisfactory and they were discharged with no physical disabilities and in good health after they attained a weight of approximately 6 pounds. Apgar scores were available for only 20 of the 26 term infants in this study; these 20 had scores of 8 or above, and none of the 20 had any clinical problems in their follow-up visits.

Repeat sonographic study was performed in 7 women; hemorrhage persisted up to twelve weeks in 3 of these patients and disappeared within ten days in 4. There seemed to be no correlation between the size of the subchorionic hemmorhage and the prognosis of the pregnancy.

Some of the subchorionic hemorrhages were found to contain only a few cubic centimeters of

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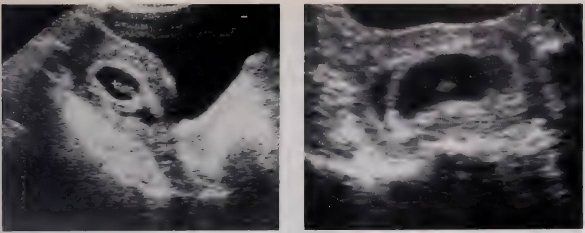


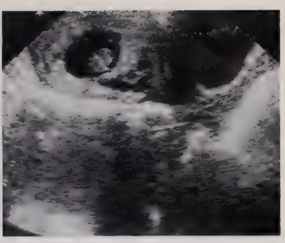
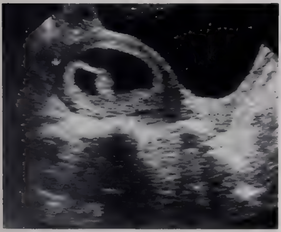


Fig. 1. Left Longitudinal scan at 7½ weeks gestation. Triangular fluid collection just inferior to gestational sac extending from edge of gestational sac toward internal os. **Middle** Transverse scan reveals crescent-shaped fluid collection to right of gestational sac. Fetal cardiac activity was noted. **Fig. 2. Right** Longitudinal scan at 9 weeks gestation reveals hypoechoid triangular fluid collection just inferior to gestational sac. Volume of fluid collection is slightly smaller than gestational sac itself. Fetal cardiac activity was present.



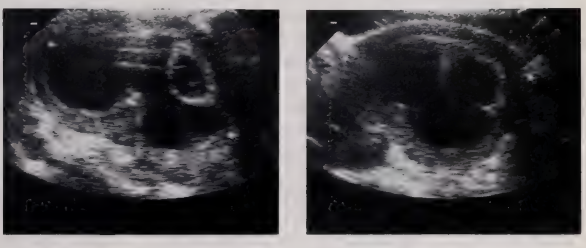


Fig. 3. Left Longitudinal scan at 6 weeks gestation reveals a moderately large anechoic collection of fluid anterior to the gestational sac. This volume is approximately three times the volume of the sac. **Fig. 4. Middle** Longitudinal scan at 7 weeks gestation reveals small gestational sac to be surrounded by very large fluid collection posterior and superior to sac itself. Volume of hematoma is about five times that of the gestatonal sac. **Right** Transverse scan reveals sac to be located posterior and to left of subchorionic hematoma.

fluid; the sonographic appearance was a crescent-shaped anechoic collection near the edge of the placenta extending a few millimeters from the placental site (Figs. 1, 2). Others were larger than the gestational sac itself. Some surrounded the sac with hypoechoic fluid and were considerably larger than the sac (Figs. 3, 4).

Discussion

Bleeding in the first trimester of pregnancy is seen in a higher percentage of private patients than in hospital clinic patients because the former tend to seek medical care earlier. Spontaneous abortions occur in 15% to 25% of all pregnancies; if pregnancies could be monitored earlier, the incidence would probably be higher. Bleeding in the first trimester is associated with up to a 50% chance of miscarriage. Bleeding may be the first sign of fetal death, which may clinically progress with cramps and severe bleeding. Less often, with fetal death, the uterus remains quiet, and only after a number of weeks is the uterus found not to have grown. Serial quantitative blood HCG hormone tests repeated at 48-hr intervals may give a clue.

The only immediately accurate method of knowing if the fetus is still alive is by sonograph. This technique may also reveal the source of bleeding and differentiate among the variety of causes of first trimester bleeding, including—in addition to subchorionic hemorrhage—blighted second ovum, ectopic pregnancy, missed abortion, and hydatidiform mole.

Subchorionic hemorrhage in a patient with vaginal bleeding is important. In the presence of fetal heart activity in a patient with vaginal bleeding but no subchorionic hemorrhage, the prognosis is almost universally good, whereas in the presence of a subchorionic hemorrhage, approximately 10% to 15% of patients have complications. In this series, the complications included two premature labors and three missed abortions. However, 15% to 20% of women who have bleeding in the first trimester have miscarriages or some other type of obstetric complication. From this study, therefore, it would seem that subchorionic hemorrhage in the presence of positive fetal heart activity is a relatively benign finding with a good prognosis.

Literature Review. The findings in our series correspond to the data collected by Goldstein et al. of a 20% complication rate with subchorionic hemorrhage (1). They, too, did not note any correlation between the size of the subchorionic hemorrhage and the outcome of the pregnancy. The entity of chorio-amniotic separation is probably different from subchorionic hemorrhage in that the former is usually asymptomatic and found incidentally during routine obstetrical ultrasound (2, 3). In Sauerbrie and Pham's series of 30 patients (4), 7 had cramps; also, the subchorionic hemorrhage disappeared in most by four weeks, but a few persisted for eight to twelve weeks. In this series, 50% of patients had normal deliveries, 23% had premature deliveries, 13% had stillbirths, and 10% had spontaneous abortions. These authors found a positive correlation between subchorionic hemorrhage size and the outcome of pregnancy. Mantoni et al also noted a poorer prognosis when subchorionic hemorrhage was larger than 50 cc (5).

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Amiodarone Hepatotoxicity: Progression from Steatosis to Cirrhosis

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RONALD GORDON, Ph.D., SWAN N. THUNG, M.D., AND FENTON SCHAFFNER, M.D.

Amiodarone, an iodinated benzofuran derivative, has recently become an important addition to the medical therapy of refractory and life-threatening ventricular arrhythmias. Although amiodarone is less cardiotoxic than other antiarrhythmic agents, it is not free of side effects (1–3). Some important complications of amiodarone therapy include pulmonary fibrosis, thyroid dysfunction, amiodarone-induced dermatopathy, peripheral neuropathy, corneal ocular deposits, and varying degrees of hepatic dysfunction (1, 4, 5).

Amiodarone is lipid soluble and thus shows a predilection for lipid-laden organs such as the liver. We report a case of amiodarone hepatotoxicity with serial liver biopsies demonstrating the progression to cirrhosis when treatment was continued 27 months following the development of steatosis.

Case Report

In March 1983 a 75-year-old woman began receiving amiodarone treatment for malignant ventricular tachycardia unresponsive to multiple antiarrhythmic regimens. She had had a myocardial infarction many years before, followed by chronic angina and ventricular ectopy, including refractory ventricular tachycardia requiring resuscitation. Cardiac catheterization demonstrated a left ventricular aneurysm, normal coronary arteries, and no inducible spasm. After unsuccessful trials with several different agents, amiodarone therapy, 800 mg/day, was initiated. The results of pretreatment studies of aminotransferase activity and thyroid function were normal.

Seven months after starting amiodarone therapy, the patient was admitted to the hospital with hyperpyrexia, hepatic enlargement, and tenderness. Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) activities were minimally elevated; alkaline phosphatase activity and bilirubin were normal. Antinuclear antibodies were negative. Antibody to hepatitis B surface antigen was detected. A percutaneous liver biopsy was performed (see below). The dose of amiodarone was decreased to 400 mg/day, with an improvement of her symptoms, but persistence of mild elevation of serum aminotransferase activities. The dose was subsequently raised to 600 mg/day for recurrent ventricular tachycardia, and again reduced for rising serum aminotransferase activities. In October 1985, the alkaline phosphatase activity was 850 IU/L (normal 30–110), AST 140 IU/L (normal 10–50). The drug was temporarily discontinued, but again restarted at 200 mg/day when the serum aminotransferase activities fell. Another liver biopsy was performed. The amiodarone was stopped and the patient treated with other antiarrhythmic agents without success. She subsequently underwent cardiac aneurysmectomy. She has since done well, requiring two hospitalizations for supraventricular tachycardia. Her serum aminotransferase activities have all returned to normal.

Pathology of Liver Biopsy Specimens. The first liver biopsy, done 7 months after initiation of amiodarone therapy, revealed preservation of

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hepatic architecture. The most remarkable finding was moderate macro- and micro-vesicular steatosis and ballooning of rare hepatocytes (Fig. 1). Mallory's hyalin was not seen. A few small foci of hepatocellular necrosis were present. Portal tracts were unremarkable. Glycogenated nuclei were seen in periportal hepatocytes. No specimen was submitted in glutaraldehyde for electron microscopic studies.

The second liver biopsy specimen, obtained 27 months after the first one, revealed micronodular cirrhosis with moderate inflammation and proliferation of bile ductules in the fibrous septa, which mainly connect adjacent portal areas. The hepatocytes had reddish granules in the cytoplasm, representing accumulation of phospholipids (granular cells). Steatosis was not noted. Rare periportal hepatocytes contained Mallory's hyalin (Fig. 2).

Electron microscopic studies revealed areas of fibrosis. Lysosomal electron-dense lamellar inclusions of varying size were seen throughout the cytoplasm, especially concentrated around bile canaliculi (Fig. 3). Distribution of the lamellar inclusions varied among hepatocytes. Many mitochondria were distorted and contained crystalline material. Both smooth and rough endoplasmic reticulum appeared dilated, as were the Golgi complexes.

Discussion

Amiodarone produces an acquired systemic phospholipidosis which resembles that seen in the primary phospholipidoses, such as Fabry's, Niemann-Pick, and Tay-Sachs diseases (6). This phospholipidosis results from the accumulation of amiodarone and its metabolite *N*-desethyl amiodarone in different organs of the body, particularly the liver. An increase in the lysosomal dense bodies occurs in hepatocytes, Kupffer cells, bile duct epithelium, and, to a lesser degree, in the endothelium, smooth muscle, and connective tissue (7). Accumulation of amiodarone appears to occur exclusively in lysosomes sparing the mitochondria and microsomes. The formation of nondigestible complexes of the protonized drug with phospholipids and/or the inhibition of lysosomal phospholipase activity may be responsible for the predilection of drug accumulation in lysosomes (7, 8). Amiodarone is a known potent inhibitor of lysosomal phospholipase A1 and A2 in rat alveolar macrophages and rat liver (9, 10). Thus, amiodarone produces a secondary phospholipidosis.

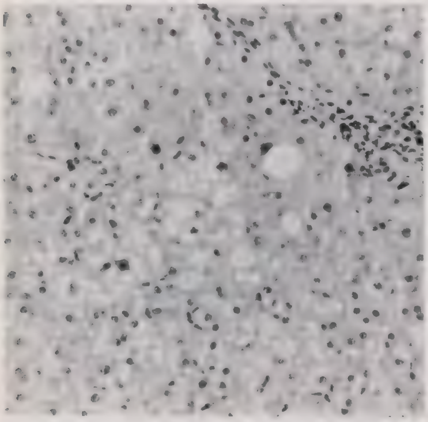

Fig. 1. The first liver biopsy specimen reveals normal lobular architecture, micro- and macro-vesicular steatosis (H&E, original magnification ×250).

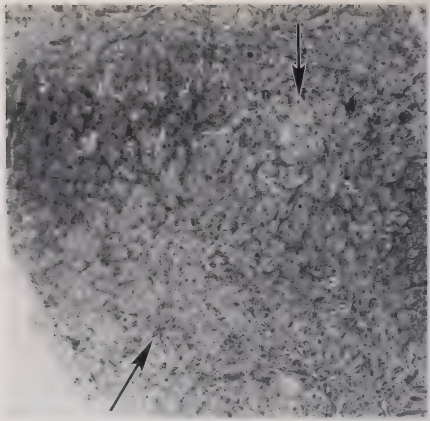

Fig. 2. The second liver biopsy specimen. A Small nodules surrounded by fibrous septa (arrows), which contain proliferating bile ductules and inflammatory cells (H&E, original magnification ×100).

The reported frequency of liver toxicity produced by amiodarone ranges from 10% to 55% (1, 5). Harris et al reported elevations of the serum aminotransferase activities in 15 of 100 patients treated for an average of two years (4). Serum aminotransferase activities fluctuated in this group but did not persist despite continuation of treatment. Recently, amiodarone-induced cirrhosis, sometimes leading to death, has been reported (11, 17). In most cases, liver toxicity is more closely related to the total cumulative dosage than to the daily dosage.

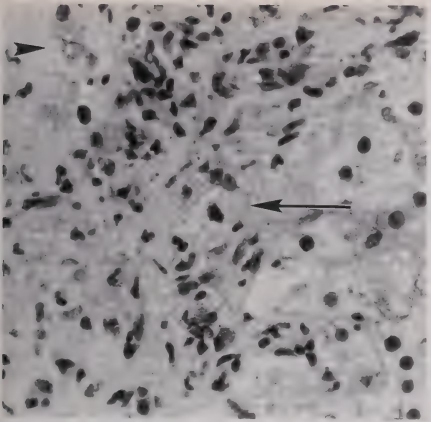

Fig. 2. B Periportal hepatocytes with cytoplasmic granules (arrow) and Mallory's hyalin (arrow head) (H&E, original magnification ×400).

The light-microscopic findings of amiodarone toxicity may mimic the steatonecrotic lesion of alcoholic liver disease. Initially, focal collections of swollen hepatocytes, often with granular cytoplasm and inflammatory cells predominantly grouped in a perivenular location are seen. Mallory's hyalin, often surrounded by polymorphonuclear leukocytes, has also been described but need not be present to establish the diagnosis (8, 11, 14, 18). Portal and lobular inflammation also is seen. Hepatocellular necrosis occurs, leading to scarring with the development of fibrosis and micronodular cirrhosis (8, 11, 12, 14, 15). The perivenular aggregation of granular cells may be the earliest morphologic manifestation of amiodarone toxicity (8). Granular cells which represent phospholipid-laden hepatocytes were noted in the second biopsy specimen but not in the first one.

Some of the hepatic abnormalities produced by amiodarone may be seen only under the electron microscope (19). Osmiophilic, electron-dense lysosomal inclusions may be located throughout the cytoplasm, but are most abundant in the vicinity of the bile canaliculus. These irregularly shaped inclusions take on various forms and structures. Laminated bodies, concentrically arranged membranes, fingerprint-like myelin figures, and loosely or densely packed curled membranous assays have been described (11, 12, 15, 18).

Abnormalities in serum aminotransferase activities, often slight or asymptomatic, may herald the development of irreversible liver damage. Not all abnormalities, however, indicate life-threatening or irreversible liver injury. Earlier reports had recommended monitoring without discontinuation of amiodarone for fluctuations or elevation of aminotransferase activity (4). Recent literature indicating the potential life-threatening toxicity of the drug, however, suggests that early biopsy with electron microscopic studies be done in all patients on long-term therapy who develop persistent elevation of liver tests.

Because of the severe adverse reactions reported with amiodarone, recommendations have already been made that this drug be used only when all other antiarrhythmic agents have failed (20). In addition, we recommend that the risk of progression to chronic liver disease, as evidenced by this case and those previously reported, though small, necessitates establishment of guidelines for periodic surveillance of liver tests in patients receiving amiodarone. Any persistent elevation of aminotransferase activity should dictate cessation of the medication, if possible, and/or further workup with liver biopsy, which should include electron microscopic examination.

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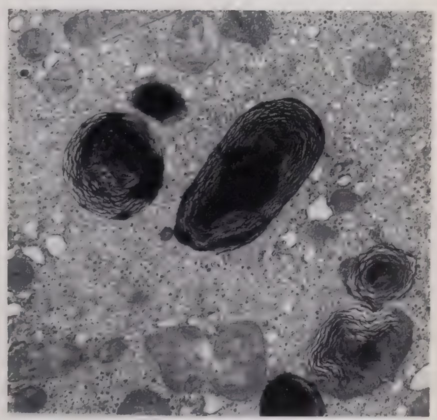

Fig. 3. Electron micrograph showing lysosomal electron-dense lamellar inclusions of varying size in the cytoplasm of hepatocytes (uranyl acetate, original magnification ×20,000).

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Tuberculous Abscess of the Pancreas in AIDS: CT Findings

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Abstract

Tuberculous abscess of the pancreas is a rare complication of disseminated tuberculosis. The computed tomographic appearance of a tuberculous pancreatic abscess in a patient with acquired immune deficiency syndrome (AIDS) is described. One should consider this diagnosis whenever a patient with AIDS has diffuse abdominal lymphadenopathy.

Patients with acquired immune deficiency syndrome (AIDS) are at increased risk for developing abdominal tuberculosis. Ascites, gastrointestinal changes, and diffuse lymphadenopathy are the usual initial symptoms; the pancreas, however, is rarely involved. We report a case of tuberculous abscess of the pancreas identified on computed tomography (CT).

Case Report

A 40-year-old Peruvian man consulted his physician for a 4-week history of fever, weight loss, and epigastric pain. The medical history was significant for homosexuality and several episodes of shigellosis. Physical examination was unremarkable. Laboratory studies on admission revealed elevated liver function tests (SGPT 320 U/L, alkaline phosphatase 811 U/L, total bilirubin 2.4 mg/dL), and a white blood cell count of 17,000/mm^3. Chest x-ray showed a right paraspinal soft tissue bulge at the level of the diaphragm, as well as ill-defined densities in the right midlung field. CT scan of the abdomen demonstrated a focal, low-attenuation mass in the head of the pancreas (Fig. 1). There was marked peripancreatic, retrocrural, and retroperitoneal lymphadenopathy. Several of the lymph nodes had hypodense centers and rim enhancement (Fig. 2). No masses were identified in the liver and there was no evidence of biliary obstruction.

The patient's deteriorating condition ultimately required surgical exploration, resulting in drainage of a pancreatic abscess. Specimens taken from the pancreas and peripancreatic lymph nodes showed extensive granulomatous inflammation and numerous acid-fast bacilli. Cultures of the aspirate from the pancreatic abscess yielded *Mycobacterium tuberculosis.* The patient's postoperative course was uneventful and he was treated with isoniazid, ethambutal, and streptomycin.

During his outpatient follow-up, the patient was found to have antibodies to human immunodeficiency virus (HIV) and subsequently met the Center for Disease Control criteria for AIDS.

Discussion

Abdominal tuberculosis, although considered relatively uncommon outside of developing countries, is being reported with increasing frequency in AIDS patients (1, 2). Pancreatic tuberculosis, however, remains a rare manifestation of this syndrome. The CT appearance of pancreatic tuberculosis, although not pathognomonic of the disease, may suggest the diagnosis and permit early, aggressive medical therapy.

CT is capable of demonstrating the major manifestations of abdominal tuberculosis, in-

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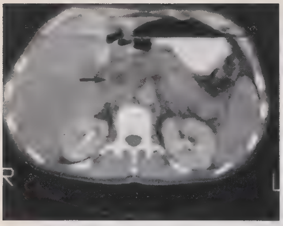

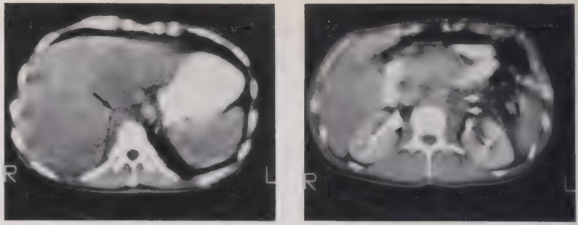

Fig. 1. Left CT scan demonstrating necrotic lesion in head of pancreas (arrow) representing tuberculous abscess. **Fig. 2. Middle** CT scan of upper abdomen showing large retrocrural lymph nodes (arrow). **Right** Bulky retroperitoneal lymphadenopathy with several nodes demonstrating low-density centers suggesting necrosis and rim enhancement (arrows).

cluding tuberculous peritonitis, intraluminal disease, and adenitis (2–5). Tuberculous peritonitis is characteristically manifest by a dense ascites with attenuation values ranging from 20 to 45 HU (4, 5). This is due to the high protein and cellular content of tuberculous ascites (6, 7). Gastrointestinal tuberculosis classically involves the ileocecal region, where it can cause ulceration and stricture formation in a pattern indistinguishable from Crohn's disease or present as a hypertrophic mass due to a florid inflammatory reaction involving the intestinal wall, mesentery, and mesenteric lymph nodes (6, 7). CT demonstration of ileocecal disease in association with a thickened, nodular mesentery and adenopathy is suggestive of intestinal tuberculosis (2). Abdominal lymphadenopathy may be the most common manifestation of tuberculosis when evaluated by CT. Tuberculous adenopathy characteristically involves the mesenteric, peripancreatic, and, to a lesser degree, retroperitoneal nodes (2). Extensive caseation necrosis and peripheral inflammatory reaction cause the nodes to appear hypodense with rim enhancement (3, 4).

Despite the wide spectrum of disease in abdominal tuberculosis, the pancreas remains an unusual site of involvement. The pancreas may be locally invaded by caseating retroperitoneal nodes or seeded during miliary dissemination (8, 9). For unknown reasons, however, it is resistant to this organism. In two autopsy series of patients with miliary tuberculosis, pancreatic involvement was found in only 2.1% and 4.7% of cases, respectively (10). Although uncommon, pancreatic involvement by tuberculosis may develop into acute or chronic pancreatitis or cause pancreatic or biliary obstruction (11). Abscess formation is rare, even in patients with diminished cell-mediated immunity (11, 12).

Tuberculous abscess of the pancreas does not present with pathognomonic findings on CT; however, the correct diagnosis may be suggested when ancillary findings of abdominal tuberculosis are demonstrated. Tuberculous pancreatic abscess usually presents as a focal low-attenuation mass in the head of the pancreas (10–12). There may be no differentiating features from a necrotic pancreatic neoplasm or focal edematous pancreatitis (9, 11). However, the CT demonstration of a low-attenuation pancreatic mass in association with the extrapancreatic findings of abdominal tuberculosis, including high-density ascites, mesenteric thickening, and rim-enhancing low-density adenopathy, is highly suggestive of a tuberculous pancreatic abscess.

Patients with AIDS present special problems in the diagnosis of abdominal tuberculosis as they are at risk for a number of atypical malignancies and infections that may simulate the CT appearance of tuberculosis. The most common abdominal neoplasms associated with AIDS are Kaposi sarcoma and non-Hodgkin lymphoma (13). Both these malignancies have diffuse lymphadenopathy as predominant features. Disseminated *Mycobacterium avium intracellulare* is a frequent opportunistic infection in AIDS patients which is indistinguishable from tuberculosis by CT (2, 13, 14). In all AIDS patients, the differential diagnosis of diffuse adenopathy must include Kaposi sarcoma, lymphoma, and opportunistic infections, including typical and atypical tuberculosis.

Fine-needle aspiration cytology (FNAC) with appropriate staining techniques provides an accurate method of diagnosing the malignancies and infections commonly associated with lymphadenopathy in AIDS patients. FNAC can readily detect acid-fast bacilli and provide material for culture to differentiate tuberculous from nontuberculous mycobacteria (7, 15). This method is also able to establish a cytologic diagnosis of Kaposi sarcoma (7, 15) and lymphoma (15, 16). FNAC is an effective method of evaluating abdominal lymphadenopathy while avoiding the risks of surgery.

We present an unusual case of a tuberculous abscess of the pancreas in a patient who subsequently developed AIDS. Patients with AIDS are susceptible to a wide range of opportunistic infections, including severe and unusual manifestations of tuberculosis. Although there are no CT findings that are pathognomonic of pancreatic tuberculosis, the presence of low-density, rim-enhancing mesenteric and peripancreatic nodes, high-attenuation ascites, and a necrotic pancreatic mass is highly suggestive and, especially in patients at increased risk, should prompt the use of early, aggressive diagnostic procedures.

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Pulmonary Actinomycosis in a Patient with HIV Infection

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Abstract

Pulmonary actinomycosis is a rare clinical entity. It may arise primarily from aspiration of infected oropharyngeal material or secondarily from contiguous spread of cervicofacial or abdominal infection. We report the case of an HIV-seropositive patient with a two-week history of fever, a productive cough, and pleuritic chest pain. Chest x-ray revealed bilateral patchy alveolar infiltrates. Histologic examination of transbronchial biopsy specimens revealed acute inflammation and granules with radiating gram-positive filaments with clubbed ends consistent with actinomycosis. The patient responded to intravenous penicillin and is currently well on long-term enteral antibiotic therapy.

Associated with the acquired immune deficiency syndrome (AIDS) epidemic has been the frequent presentation of otherwise rare opportunistic infections and neoplasms (1). Most patients have *Pneumocystis carinii* pneumonia or Kaposi's sarcoma, or both. Mycobacterial disease has also been described as both a harbinger and a sequel of AIDS (2). We describe below the first reported case of pulmonary actinomycosis in a patient with a history of intravenous drug abuse and human immunodeficiency virus (HIV) infection.

Case Report

A 42-year-old black man with a history of intravenous drug abuse and seropositivity for human immunodeficiency virus (HIV) infection was admitted to another hospital with a two week history of fever, cough productive of white sputum, and dyspnea. Chest x-ray revealed bilateral nodular infiltrates, and intravenous trimethoprim-sulfamethoxazole was begun. The patient refused fiberoptic bronchoscopy and, on the fourteenth hospital day, was discharged against medical advice. A repeat chest x-ray at the time of discharge showed some improvement of the infiltrates.

Six weeks later the patient came to Beth Israel Medical Center with a two-week history of fever, night sweats, cough productive of blood-tinged sputum, and left-sided pleuritic chest pain. There was no history of tuberculosis or previous respiratory tract infections. The patient was a heavy ethanol abuser and had smoked two packs of cigarettes a day for 15 years. No history of occupational exposure to dust or fumes was noted.

On examination, the patient was noted to be in mild respiratory distress with a respiratory rate of 25/min, a pulse rate of 130/min, a blood pressure of 126/90 mmHg, and a temperature of 101.2°F rectally. Head and neck examination were unremarkable. The oral examination revealed poor dentition, but no masses were noted.

Examination of the lungs was remarkable for bronchial breath sounds and egophony at the left base with expiratory wheezes throughout both lung fields. The remainder of the physical examination was normal. White blood cell count was 8,500/mm^3, with 23% neutrophils, 52% band forms, 20% lymphocytes, and 5% monocytes. Arterial blood gas on room air showed a pH of 7.48,

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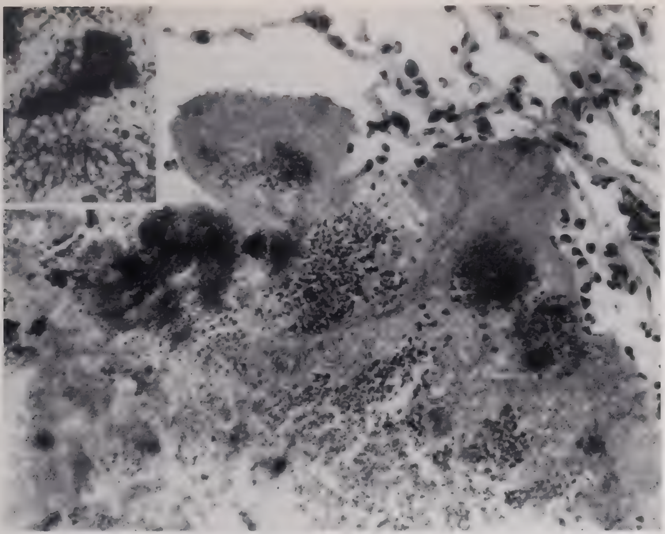
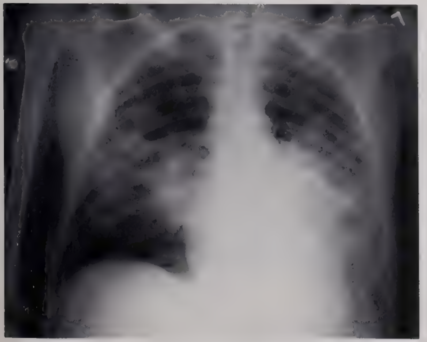


Fig. 2. Multiple grains of *Actinomyces* in the lung surrounded by inflammation (H&E ×240). Inset: Branching filaments (methamine silver ×480).

a PaO_2 of 57 mmHg and a PCO_2 of 35 mmHg. A chest x-ray revealed bilateral patchy alveolar infiltrates (Fig. 1).

Treatment with trimethoprim-sulfamethoxazole, 960 mg every 6 hr, and aminophylline was begun. On the fourth hospital day the patient remained febrile, and cefotaxime, 2 g every 8 hr, and gentamicin, 60 mg every 8 hr, was begun. A repeat chest x-ray showed no improvement of the infiltrates, and on the sixth hospital day a fiberoptic bronchoscopy was performed. The endobronchium on inspection was unremarkable and



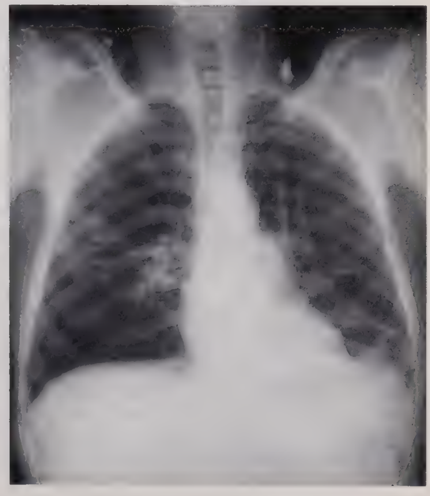


Fig. 1. Left Chest x-ray on admission showing bilateral patchy infiltrates. **Fig. 3. Right** Repeat chest x-ray showing improvement of infiltrates after antibiotic treatment.

bronchial washings revealed no acid-fast organisms, fungi, or *P. carinii.*

Pathologic examination of the transbronchial biopsy specimen revealed fragments of bronchial wall and lung parenchyma with acute inflammatory exudate and multiple grains (colonies) within each tissue fragment (Fig. 2). Each grain consisted of multiple gram-positive, non-acid-fast filaments with terminal eosin-staining clubs diagnostic of *Actinomyces* infection (Fig. 2, inset). Twelve million units of intravenous penicillin G a day were begun, and the patient slowly defervesced over a period of 3 weeks; the infiltrates markedly improved on chest x-ray (Fig. 3). Bronchial washings and biopsy specimens were not specifically cultured for *Actinomyces,* and cultures for fungi and mycobacteria revealed no growth after 8 weeks.

Discussion

Actinomycosis is an uncommonly diagnosed cause of human disease. The infrequency of the disease, the low degree of physician suspicion of it, and the susceptibility of the organism to a wide variety of antibiotics all contribute to the difficulty in establishing the diagnosis of actinomycosis (3). Although the majority (55%) of clinical disease cases are cervicofacial, 15% are pulmonothoracic, infection at that site occurring most often by aspiration of oropharyngeal material, usually in the setting of recent oral trauma or severe dental disease (4). Underlying pulmonary conditions, such as chronic obstructive pulmonary disease and bronchiectasis, may predispose to this infection. However, this entity has rarely been reported in patients with HIV infection. Yeager et al reported a case of cervicofacial actinomycosis in a 23-year-old bisexual man with presumed HIV infection documented from a submandibular abscess which grew *Actinomyces israelii* on culture (5). Holtz et al also reported four cases of Actinomycetales infection in parenteral drug abusers, three of whom had nocardiosis and one with *Streptomyces* infection. *Actinomyces* was not isolated in any of the specimens (6).

Although we were unable to establish a diagnosis of actinomycosis through culture methods, a histopathologic diagnosis was based on the finding of granules in the tissue and the clinical improvement of the patient on penicillin therapy. We could not dismiss our finding as a contaminant introduced into the lung via the bronchoscope, since *Actinomyces* rarely has been isolated as a contaminant. Benhoff, in his review of 32 cases of actinomycosis, reported isolation of this organism in bronchial washings only in cases where it was subsequently considered to be an offending pathogen (3). In addition, in our patient, the findings of these organisms within the lung parenchyma surrounded by an acute inflammatory process is strongly suggestive of a true infectious process. The rare presence of this organism in other patients with a similar social background and history of underlying immunosuppression at our institution makes this a likely diagnosis. Failure to recover *Actinomyces* from the bronchoscopic specimens is attributable to the lack of suspicion for its presence and to antibiotic treatment prior to the bronchoscopy.

Whether this patient's HIV infection was contributory or coincidental to the development of actinomycosis infection is unclear. Even among patients with HIV infection, *Actinomyces* rarely behaves as a true opportunistic pathogen. Patients receiving long-term cancer chemotherapy or prolonged corticosteroid therapy have not shown an increased incidence of actinomycosis infections (7). Although it has been shown that patients with AIDS have higher than usual rates of pyogenic and mycobacterial infection (2), as yet this is apparently not true for all potential pathogens. Like *Mycobacterium tuberculosis, A. israelii* is an organism whose containment is dependent on granuloma formation and intact T-cell function. Whereas in the AIDS population with significant T-cell abnormalities, mycobacterial disease has become a common cause of pulmonary infection, actinomycosis remains a rare entity. This may be due to the lack of rigorous culture techniques required for growth and the susceptibility of the organism to the antibiotics commonly used to treat persons with AIDS, such as trimethoprim-sulfamethoxazole, isoniazid, rifampin, and the cephalosporins (8).

Whether this patient's original pulmonary infection was due to *Actinomyces* is unclear. The patient was coincidentally treated with a bacteriostatic drug, trimethoprim-sulfamethoxazole, and improved. When treatment ended, he relapsed with clinical disease, a finding characteristically described with *Actinomyces* infection (3). The potential for dissemination of this disease in the AIDS population has not been established, probably because the infection has so far been infrequent.

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Isolated Dislocation of the Radial Head

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Abstract

Isolated dislocation of the radial head without fracture of the ulna is an uncommon injury. Though rare in children, it has been reported. A review of the world literature revealed only two reported cases in adolescents. This paper presents three previously unreported cases and reviews the mechanism of injury and problems associated with delayed treatment.

Debate and confusion still surround the place of isolated radial head dislocation within the spectrum of children's elbow injuries. The injury is uncommon. Some maintain that an occult fracture of the ulna must always accompany the radial head dislocation or that the ulna must bend, thus making it a variant of a Monteggia fracture (1, 2). Controversy exists on this point.

Initial clinical and radiographic findings may be subtle, and recognition of the injury at initial presentation is the key to a successful outcome. Long-term impairment has been noted in cases that were not diagnosed early (1, 3–5).

A case on the Pediatric Orthopaedic Service at City Hospital Center at Elmhurst (CHCE) of a dislocated radial head in an adolescent stimulated this review of the literature and presentation of cases not previously reported.

Case Histories

Case 1. A 9-year-old girl was referred for evaluation on June 14, 1982, with a painful right elbow following an injury that occurred when the patient fell while playing. Physical examination revealed a markedly swollen elbow and tenderness over the radial head. Roentgenologic examination demonstrated an anterior dislocation of the radial head without fracture (Fig. 1a). No previous trauma to the extremity was noted.

A single unsuccessful attempt at closed reduction was made during the office visit. The patient was admitted to the hospital, where, on the following day, the dislocation was reduced under general anesthesia. After the elbow was extended, the forearm was supinated and thumb pressure was applied over the radial head. The radial head was felt to be reduced and the elbow was gradually flexed to 90 degrees and maintained in supination while a long-arm posterior splint was applied. Radiologic examination confirmed the reduction (Fig. 1b). The patient did well postoperatively and was discharged that evening.

Serial radiographs were taken on follow-up visits to confirm alignment of the radial head. Immobilization was discontinued on July 29, 1982, at which time active range-of-motion exercises were started. Follow-up examination four months later showed full range of motion in all planes equal to that of the uninjured elbow. This has been maintained at five years.

Case 2. A 16-year-old Oriental girl came to the emergency room on the night of October 20, 1984, with pain and swelling in the left arm. The patient had fallen while roller skating, landing directly on the posterior aspect of the elbow. She denied previous injury.

Physical examination revealed an exquisitely tender, swollen left elbow. The extreme pain precluded detailed examination of the arm, but gross neuromuscular function was found to be intact. Roentgenologic examination revealed an anterior dislocation of the radial head with a non-

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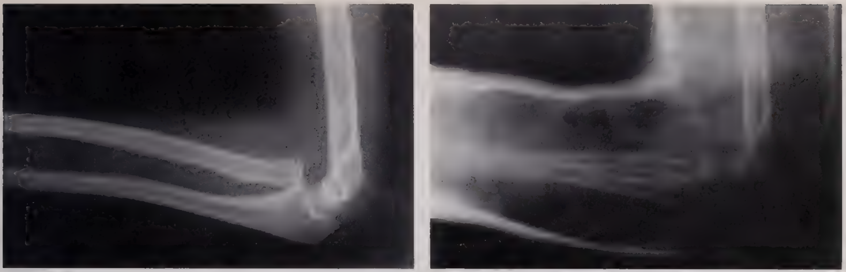

Fig. 1. **Case 1.** **A, Left** Lateral roentgenogram of right elbow showing anterior dislocation of radial head. X-rays of opposite forearm were not available. Follow-up x-rays did not show any evidence of ulna fracture, periosteal reaction, or sclerotic band indicating healing of a nondisplaced or minimally displaced fracture. **B, Right** Postreduction lateral roentgenogram of right elbow in plaster showing radial head reduced.

displaced fracture of the radial neck (Fig. 2a). No ulnar fracture was seen.

After initial splinting, the patient was brought to surgery on October 22, 1984, where, under general anesthesia, a closed reduction using fluoroscopy was performed. With the elbow in extension, the forearm was fully supinated while direct pressure was applied over the radial head. After reduction was confirmed (Fig. 2b), the elbow was held at 90 degrees in full supination in a long-arm posterior splint. She was discharged the following day.

Follow-up examination was carried out at the Pediatric Orthopaedic Clinic of the CHCE. Radiologic studies reconfirmed alignment and physical examination demonstrated full neurovascular function. The splint was removed 3 weeks after closed reduction, and range-of-motion exercises were begun. At one year follow-up, full range of motion had been regained; it was maintained at three years.

Case 3. A 20-year-old woman came to the hospital in October 1984 with a painful right elbow. The pain was aggravated by supination and pronation. On February 28, 1971, she had fallen while roller skating, injuring this elbow. At that time she was seen in the emergency room of a local hospital, where a diagnosis of "upper extremity fracture" was made and she was placed in a posterior splint. The correct diagnosis was apparently not appreciated. On review of the radiograph, the diagnosis was changed to anterior

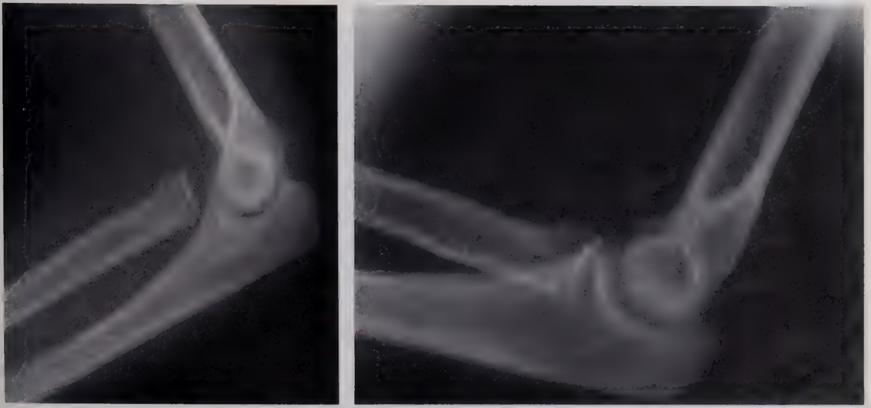

Fig. 2. **Case 2.** **A, Left** Lateral roentgenogram of left elbow showing anterior dislocation of radial head with nondisplaced fracture of radial neck. **B, Right** Postreduction lateral roentgenogram of left elbow showing radial head reduction without displacement at radial neck fracture site. The difference between views A and B appears due to distance from the beam rather than a change in limb positioning as judged by the humerus projection in each x-ray.

dislocation of the radial head. The treating physicians were not apprised of the change in diagnosis and early follow-up films were not taken.

The arm was splinted for 2 weeks, at which time the splint was removed. A radiograph taken at that time showed a persistent radial head dislocation. The patient had limited range of motion, which improved only slightly with physical therapy, and she sought other help.

On April 21, 1971, she was admitted to another local hospital, where an open reduction through an anterolateral approach was performed. It was noted that the radial head had buttonholed through the annular ligament and that there was fibrotic tissue in the joint space. Reduction was maintained with a Kirschner wire passed through the capitellum into the radial head. The K-wire was removed on May 21, 1971, at which time maintenance of reduction was noted. The patient was placed on a physical therapy program.

In October 1971, radiographs showed anterior subluxation of the radial head. Motion was 0–95 degrees, with full supination and 10 degrees of pronation. The patient remained relatively free of pain until May 1984.

Over the next 5 months her pain increased markedly and she again sought medical attention. Radiographs showed the persistently dislocated radial head, now combined with some degenerative change at the elbow joint (Fig. 3a).

On November 12, 1984, a radial head excision was performed (Fig. 3b). The patient was informed preoperatively that the surgery might not relieve her pain or improve her motion. No changes in these parameters were noted by 8 months after surgery.

Discussion

Isolated radial head dislocation can be congenital or can follow trauma. Congenital disloca-

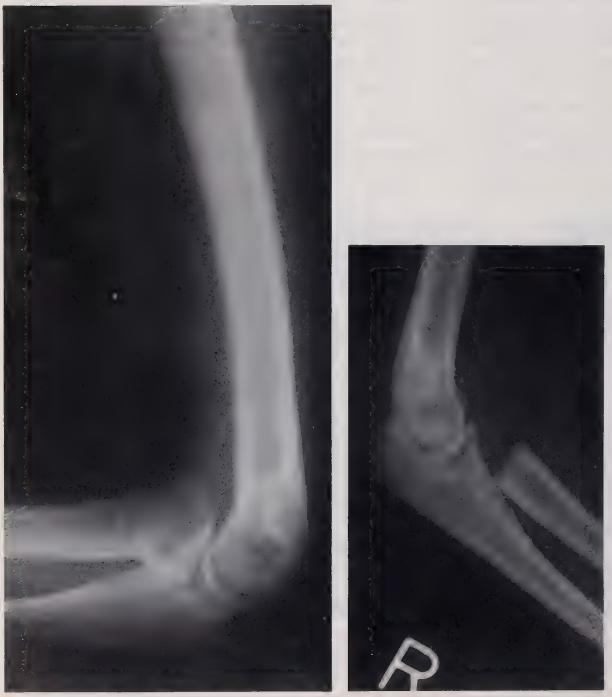

Fig. 3. **Case 3.** **A, Left** Lateral roentgenogram of right elbow showing dislocated radial head with evidence of long-term dislocation, including rounding of radial head profile and degenerative changes of elbow joint. **B, Right** Postoperative lateral roentgenogram of left elbow after excision of radial head.

tion has a different etiology, a different effect on the elbow, and a different prognosis than traumatic dislocation. It is not discussed in this paper.

Traumatic isolated radial head dislocation is uncommon. The previously reported cases are summarized in the Table. No specific physical finding differentiates this injury from other, more common forms of elbow injury. The findings may be subtle. Patients generally exhibit decreased motion, with a swollen, tender elbow. The key to diagnosis lies in the lateral radiograph, and as Wang (6) points out, the anterior four-fifths of the radial head should be in contact with the ulna on the lateral radiograph. In addition, a straight line through the long axis of the radius passes through the center of the capitellum or its epiphysis.

The mechanism of injury is similar to that in a Monteggia fracture, although the proximal ulna or olecranon remains intact. Evans (7) reported that the injury occurs as the trunk pivots around the affected upper extremity, which is fixed, hand down on the ground in pronation. This hyperpronation force causes the annular ligament to rupture and the radial head dislocates.

Although some authors (8–11) agree with this view, some controversy exists. Wiley et al (12), using cadaver specimens, found that anterior dislocation of the radial head could be reproduced only with great difficulty. The dislocation occurred with the forearm in extreme supination and a force directed anteriorly on the posterior aspect of the elbow with the anterior capsule and annular ligament completely severed. Thomas (13) felt that the dislocation was produced by the force of the elbow striking the ground and from the secondary flexion caused by the impact of the palm on the ground.

Salter and Zaltz (14), in their cadaver studies of the anatomic basis of the mechanism of injury of "nursemaid's elbow," felt that in children over 5 years of age the injury could not be reproduced. They attributed this to the fact that thickening of the annular ligament at this age prevented the tearing that was necessary for radial head subluxation to occur. Presumably, the greater trauma involved in dislocation of the radial head is enough to cause a rupture of the annular ligament, thus allowing the head to dislocate. Interestingly, in two of these cadaver specimens, irreducible subluxations were produced. In these cases it was found that the tear in the annular ligament extended over more than half its length, allowing the radial head to buttonhole in the ligament. The same buttonhole phenomenon has been previously reported in isolated dislocation (15) and was seen in the third patient presented here.

TABLE

Reported Cases of Traumatic Isolated Anterior Radial Head Dislocation

Author (Year)	No. of cases reported
Cavlak & Kindel (1984)	1
Lloyd-Robert & Bucknill (1977)	2
Svend-Hansen & Jensen (1977)	7
Neviaser & LeFebre (1974)	1
Wiley et al (1974)	4
Hamilton & Parkes (1973)	1
Novotney & Florian (1970)	1
Vesely (1967)	13
Stelling & Cote (1956)	9

Rang (2) and Letts et al (1) maintain that isolated dislocation of the radial head does not occur without some deformation of the ulna. They believe that this ulna bending is suggestive of a Monteggia-equivalent injury. Hamilton and Parkes (8) contend that it is precisely this flexibility of the child's ulna that allows some anterior bowing without fracture and permits isolated radial head dislocation. This may explain the occurrence in young children, but it does not pertain to the second case presented here, a 16-year-old girl with closed epiphyses. The reason that she suffered this injury, rather than the more common Monteggia fracture seen in adults, remains unclear.

An initial attempt at reduction can be made when the patient is first seen. Reduction can be accomplished with the patient under general anesthesia, with the extremity rotated in full supination while direct pressure is applied to the radial head. Image intensification fluoroscopy expedites the procedure greatly. The arm is then flexed to 90 degrees and placed in a long-arm posterior splint. Immobilization is maintained for 3–4 weeks (10), at which time range-of-motion therapy should begin. Reduction was initially unsuccessful in the first two cases reported here, presumably owing to lack of cooperation secondary to extreme pain. In the third case, lack of recognition of the dislocation precluded an attempt at reduction.

Despite Stelling and Cote's report (16) of five cases of unreduced traumatic anterior dislocation of the radial head with no long-term functional impairment, the majority of evidence seems to point toward later difficulty if the injury remains untreated (1, 3, 4, 7, 9, 10, 15, 17, 18). The third patient presented here is illustrative of the problem encountered when this occurs. Her dislocation was treated late with an unsuccessful open reduction and pinning. Now, 15 years later, she has limited functional use of the extremity, as well as persistent pain and limited range of motion, despite a radial head excision. Painful cubitus valgus and late progressive radial nerve palsy have also been reported as long-term sequelae of unreduced radial head dislocation (3–5).

Summary

Three cases of anterior dislocation of the radial head are presented, two in children and one in an adolescent with closed epiphyses. The injury is uncommon. The diagnosis is made on lateral roentgenogram of the elbow. The exact mechanism of the injury in these lesions is often unclear. Prompt treatment by closed reduction is usually effective and ensures good long-term results. Reduction is done with the extremity in full supination while applying direct pressure to the radial head. The arm is then flexed to 90 degrees and placed in a posterior splint. Immobilization is maintained for 3–4 weeks. However, if closed reduction fails, open reduction should be performed. Late treatment may compromise the final result.

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Infratentorial Intratumoral Hemorrhage

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Abstract

Infratentorial intratumoral hemorrhage is infrequently reported. Owing to crowding of the vital structures in the posterior fossa, a high percentage of bleeding tumors in this region are fatal. Only six such cases of bleeding ependymomas in the posterior fossa have been documented; four of the patients died. We report a seventh case of intratumoral hemorrhage in a 4th-ventricle ependymoma. This patient survived. Reported cases of infratentorially bleeding tumors of various histologic types are reviewed. Their pathogenesis, clinical presentation, and management are discussed.

Commonly the initial clinical picture for intracranial tumors is slowly progressive neurologic deterioration. Less usual is the acute onset of major intratumoral bleeding, which is responsible for the patient's admission to the hospital. Such a pattern of onset is well documented for tumors in the supratentorial region (1, 2). There are few reports, however, of this manner of onset with tumors in the infratentorial area, and of those that we have been able to trace, no less than two-thirds had a fatal outcome.

We report a case of an infratentorial ependymoma that was asymptomatic until it bled, resulting in a massive intracerebellar hemorrhage; the patient survived. To the best of our knowledge, only six such cases have previously been documented in the literature (3–7). In addition, we have reviewed several series and individual case reports dealing with posterior fossa tumors signalled by an intratumoral hemorrhage.

Case Report

A 10-year-old boy, previously in good health, was admitted to the Neurosurgical Department of our hospital on December 16, 1986, because of sudden deterioration in his state of consciousness. In the late afternoon on the day of admission, he suddenly experienced a severe headache accompanied by projectile vomiting. Shortly thereafter, he became stuporous. The patient was taken to a neighborhood hospital, where he was resuscitated and then transferred to our hospital. The child had no previous complaints of headaches and no history of head injury or any coagulopathy.

On admission, the patient was comatose but responded well to painful stimuli, moving all his limbs symmetrically. General physical examination revealed no abnormality in any system, apart from the neurologic findings. The muscle tone was decreased in all four limbs. His pupils were equal and reactive to light; funduscopic examination revealed no papilledema. Laboratory data were within normal limits. Computed-tomography (CT) scan (Fig. 1) revealed a gross, nonhomogeneous, midline lesion in the posterior fossa; the lesion consisted of a high-density mass within the 4th ventricle, surrounded by foci of low density. Following intravenous contrast injection, high-density enhancement of several foci in the vicinity of the 4th ventricle (Fig. 2) was demonstrated.

The child was hyperventilated and given dexamethasone intravenously. An emergency right frontal ventriculostomy was performed, with the cerebrospinal fluid (CSF) collecting bag maintained at a height of 25 cm above the head. Within the next few hours marked improvement

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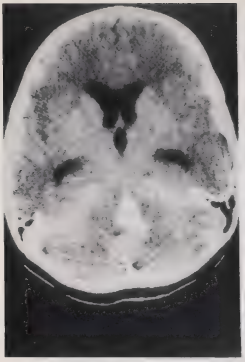

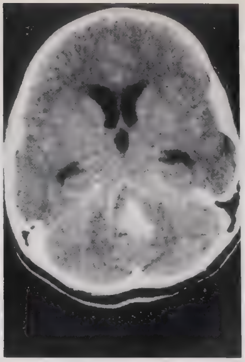

Fig. 1. Left A precontrast computed-tomography scan reveals a high-density mass within the 4th ventricle. This mass is compatible with a fresh hemorrhage. **Fig. 2. Right** Following intravenous contrast injection, a high-density enhancement of several foci surrounding the 4th ventricle is demonstrated.

occurred in his condition; he became alert and cooperative and neurologically stable.

Two days after admission, a midline suboccipital craniectomy and laminectomy of C-1 was carried out with the patient in the sitting position. The cerebellar tonsils appeared normal and the vermis was not swollen. Under the operating microscope, the vermis was incised; at a depth of 1.5 cm, a pinkish-gray, soft, friable mass was encountered. The lesion appeared to occupy the entire 4th ventricle and had invaded both cerebellar hemispheres and the brain stem. Within the ventricular cavity an organized blood clot, about 3 ml in volume, was identified and evacuated. The tumor was then resected piecemeal and subtotally removed.

Histologic examination revealed a well-differentiated ependymoma. The child's postoperative course was uneventful. The ventriculostomy cannula was removed on the third postoperative day. CT scan performed 2 days following the operation showed normal-sized ventricles. He was discharged home 10 days after the operation, walking unaided and with a mild left facial palsy.

A metrizamide myelogram was normal. Radiation therapy to the craniospinal axis was begun. When the patient was last seen, on April 20, 1987, six months following hospitalization, his neurologic examination was essentially normal.

Discussion

Brain tumors identified as a result of major intratumoral bleeding are infrequently reported but are well documented in the literature (2, 8). Most reported series deal mainly with tumors that bled in the supratentorial region. However, infratentorial tumors with significant intratumoral hemorrhage are rare. Series reporting both children and adults showed either no or very few posterior fossa tumors that bled (2, 9). Series dealing exclusively with pediatric patients, however, demonstrated a high incidence (10). It thus appears that children have a higher incidence than adults of acute hemorrhage in brain tumors in both the supratentorial and infratentorial compartments (3). This is probably a reflection of the increased probability of malignancy of brain tumors in children and the proclivity of the lesion for the posterior fossa.

In view of the important differences in regional anatomy between the supratentorial and infratentorial spaces, the proximity of the brain stem with its major pathways, and the limited spatial confines of the posterior fossa, we believe that bleeding infratentorial tumors should be considered a separate, albeit uncommon, nosologic group.

Among 5,800 patients reviewed by Locksly et al in the Cooperative Study on Subarachnoid Hemorrhage, 4% were due to spontaneous hemorrhage occurring in an intracranial tumor; none of these tumors was in the posterior fossa (11).

Scott, reviewing his personal series of 590 cases of brain tumor in adults, found 8 whose initial symptom was intratumoral hemorrhage; only one was in the posterior fossa, an incidence of 0.17% (12). Wakai et al reviewed 1,861 of their cases and reported 94 (5.1%) to have had an intratumoral hemorrhage; only 8 (0.4%) were infratentorial (6).

Laurent et al, reporting on 113 pediatric patients with intracranial tumors, found that 12 (10.6%) had intracranial intratumoral hemorrhage as the initial symptom; 6 of the 12 were

TABLE 1

Case Reports of Infratentorial Intratumoral Hemorrhage

Author	No. of cases	Age (yr)	Etiology (if known)	Site	Histology	Outcome
Epstein (19)	3	9	V-P shunt	Vermis	Astro I	S
		17	V-P shunt	4th ven	Astro II	F
		17	V-P shunt	Vermis	Astro I	S
Vincent (25)	1	14		Cereb	Astro	S
Waga (26)	1	11	V-P shunt	Vermis	Astro II	S
Vaquero (24)	2	7	Ventricul	Vermis	Astro I	F
		11	Ventricul	4th ven	Medullo	F
Wakai (6)	6			3 pons	3 astro	U
				3 cereb	1 medullo	
Laurent (10)	6	1		Vermis	Medullo	F
		1		Vermis	Medullo	S
		7		Vermis	Medullo	S
		9		Pons	Astro	F
		10		Vermis	Medullo	S
		12		Vermis	Medullo	S
McCormick (17)	1	12		Vermis	Medullo	F
Carrieri (15)	1	9		Vermis	Medullo	F
Glass (1)	1	5		Vermis	Medullo	F
Oldberg (14)	1	9	Fol RT	Vermis	Medullo	F
Globus (2)	1	7		Vermis	Medullo	F
Mauersburger (27)	2	10		Cereb	Spongio	F
		10		Cereb	Spongio	F
Specht (28)	1	8		Cereb	Astro-olig	
Shuangshoti (5)	1	6		4th ven	Ependymoma	F
Kazimiroff (3)	1	8 mo		4th ven	Ependymoma	S
Zuccarello (7)	1	1.5	V-P shunt	4th ven	Ependymoma	F
Wakai (6)	2	7		4th ven	Ependymoma	F
		5		4th ven	Ependymoma	S
Poon (4)	1	4.5		4th ven	Ependymoma	F
Reichenthal	1	10		4th ven	Ependymoma	S
Scott (12)	1	53		Cereb	Melanoma	S
Mandybur (16)	3	50		Cereb	Melanoma	F
		60		Cereb	Melanoma	F
		52		CPA	Melanoma	F
Matsumara (20)	1	54		Cereb	Hemangioma	S
McCoyd (29)	1	64		CPA	Acoust	F

F, fatal; S, survival; U, unknown; V-P, ventriculoperitoneal; Astro, astrocytoma; Medullo, medulloblastoma; 4th ven, 4th ventricle; Cereb, cerebellar hemisphere; CPA, cerebellopontine angle; Fol RT, following radiation therapy; Olig, oligodendroglioma; Ventricul, ventriculostomy.

infratentorial. In no case in this series was intratumoral hemorrhage reported in an ependymoma (10).

Hemorrhage is reported to occur more frequently in highly vascularized tumors (13). The majority of reported hemorrhages were in tumors such as glioblastoma multiforme, oligodendroglioma, medulloblastoma, and neuroblastoma and in metastatic brain tumors (14). Although ependymoma is a highly vascularized tumor, only a few cases of ependymoma with spontaneous intratumoral hemorrhage as the initial symptom have been reported. Ependymomas of the spinal cord, especially those in the filum terminale, have a relatively greater tendency to bleed (13).

In a search of the literature, we have been able to find six reported cases of ependymomas in the posterior fossa with spontaneous intratumoral bleeding as the initial symptom. Our case would constitute the seventh (Table 1) (3–7).

Ependymomas of the Posterior Fossa with Spontaneous Hemorrhage

Age at Onset. All seven patients were below the age of 11 years, and the mean age at onset was 5.8 years. Our patient was 10 years old at onset. Dohrman et al, reviewing their series of 44 pediatric cases with intracranial ependymomas and ependymoblastomas, reported a mean age of 5.6 years, with a high concentration in the first two years of life (9).

Clinical Presentation. Both the cases reported by Kazimiroff et al (3) and Zuccarello et al (7) had a history indicative of a posterior fossa

TABLE 2

Incidence of Cerebellar and Fourth Ventricular Tumors and of Reported Infratentorial Bleeding Tumors*

	Cerebellar and 4th ventricular tumors (%)	Reported infratentorial bleeding tumors No. (%)
Astrocytomas	29.0%	12/35 (30%)
Medulloblastomas	29.8%	12/35 (30%)
Ependymomas	11.1%	7/35 (17%)
Hemangioblastomas	11.6%	
Meningiomas	5.3%	
Choroid plexus papillomas	2.0%	
Metastatic neoplasms	2.5%	4/35 (10%)†

* Adapted from Zulch KJ. Brain tumors: their biology and pathology, 2nd Am. ed. New York: Springer, 1965: 78 (22).

† Melanomas.

tumor which antedated the hemorrhagic event. In the case reported by Poon and Solis (4), in one of two cases of Wakai et al (6), and in our case the initial clinical presentation was that of an apoplectic syndrome in a previously well child. Wakai et al (6), in their review of 1,861 tumors, found 11 patients in whom the apoplectic syndrome was the initial symptom without any preceding history associated with brain tumor and concluded that these cases should be differentiated from those with intracranial hemorrhages due to other causes. They suggest that in the absence of a vascular abnormality such as a cerebral aneurysm, vascular malformation, or hypertensive cerebral vascular disease, intracranial hemorrhage should be suspected as being due to brain tumor.

In all seven patients with bleeding ependymomas in the posterior fossa, the apoplectic event resulted in severe neurologic impairment. This was also seen in a significant number of the reported cases that we reviewed of tumors other than ependymomas situated in the infratentorial region with spontaneous intratumoral bleeding (15–17). By contrast, in supratentorial tumors that bleed, the clinical symptoms and signs may sometimes be mild (6). This difference in the severity of the clinical presentation in cases of tumor apoplexy in the supratentorial area compared with that in the posterior fossa is related to the lack of space and the crowding of vital structures in the latter, so that a relatively small hemorrhage in tumors in the posterior fossa may result in a severe neurologic deficit that demands urgent surgical intervention. This is in contrast to small spontaneous posterior fossa hemorrhages, not associated with tumors, which may be treated conservatively.

The case reported by Zuccarello et al (7) had an initial clinical picture distinctly different from the other four cases of bleeding posterior fossa ependymomas that we are considering. Their patient deteriorated and lapsed into coma 2 hr after the placement of a ventriculoperitoneal shunt for obstructive hydrocephalus due to a tumor of the 4th ventricle. Ventricular drainage is an accepted technique for relieving high intracranial pressure caused by an obstructive hydrocephalus. There is, however, no universal consensus about the advisability of installing a shunt prior to removal of a posterior fossa mass (18, 19). On reviewing 40 reported cases of bleeding infratentorial tumors, we found that 7 (17.5%) were related to ventricular decompression procedures (Table 1); 5 patients underwent a ventriculoperitoneal shunt and 2 underwent ventriculostomy. Our patient was subjected to a ventriculostomy rather than a ventriculoperitoneal shunt for two reasons. First, by adjusting the height of the ventriculostomy drainage bag to the appropriate level above the patient's head, siphonage of the CSF can be prevented and a more gradual and controlled reduction of intracranial pressure may be achieved. This state of affairs cannot always be guaranteed after a ventriculoperitoneal shunt is installed. Second, it may be possible to resect the tumor and thereby reestablish the previously obstructed CSF pathway. This may obviate the need for placement of a ventriculoperitoneal shunt, as, in fact, occurred in our case.

Pathogenesis of the Intratumoral Bleed. Six etiological factors responsible for the occurrence of a spontaneous massive intratumoral hemorrhage have been postulated.

1. Rupture of a fragile and malformed blood vessel within the tumor (20).
2. Occlusion of the blood vessels owing to endothelial proliferation or emboli resulting in hemorrhagic infarction (20).
3. Invasion of the arterial wall by the tumor, leading to the rupture of the blood vessel (21).
4. Vascular necrosis following radiation therapy and resultant rupture of the vessels (20).
5. Sudden changes in ICP gradients following CSF decompression (20).
6. Metabolic factors in a rapidly expanding tumor may deprive portions of the growth of adequate nutrition, leading to tumoral necrosis and hemorrhage (10).

One can only speculate as to which of these factors is responsible for initiating bleeding in individual cases. There is no clue in the history of our case to indicate which factor was operative.

On reviewing the case reports of 35 histologically verified tumors in the posterior fossa that bled, medulloblastoma (30%) and astrocytoma (30%) were found to be the two most frequent lesions, ependymomas were third (17%), and melanomas were fourth (10%) (Table 2). These frequencies are roughly similar to the relative frequencies with which these histologic types of tumor occur in the posterior fossa and thus do not appear to reflect an increased tendency for any particular tumor type to bleed (Table 2) (22).

As reflected in Table 1, melanomas comprised no less than 10% of the infratentorial metastatic tumors that bled, as opposed to the 2.5% total incidence of posterior fossa metastasis of all types reported by Zulch (23).

This marked difference is indicative of the known tendency for metastatic melanomas in the brain to bleed.

Management

A CT scan should be the initial radiologic diagnostic study in any patient with an acute neurologic disorder. When a hemorrhage is demonstrated on the noncontrast CT scan, as in our case, one should continue with a contrast CT scan to exclude the possibility of a tumor being the source of the bleeding. If the patient's condition is stable in a case suspected of being tumoral bleeding, one may continue with the performance of an angiogram to establish whether the tumor is in fact an arteriovenous malformation. In our case, the patient was stuporous and the angiographic procedure was considered too hazardous.

In the presence of hydrocephalus we prefer the placement of ventriculostomy with a high opening pressure to prevent upward herniation of the cerebellar lesion or further intratumoral hemorrhage due to sudden lowering of intracranial pressure. Previous reports have demonstrated that intratumoral bleeding can occur even with the collecting bag placed as high as 15–20 cm above the head (24). For this reason, in the case reported here we kept the CSF collecting bag at a level of 25 cm above the head. Definitive operation should be performed as early as possible, depending on the patient's clinical condition, whether there is a need for a preliminary ventriculostomy prior to operation, and the presence or absence of hydrocephalus. Early resection of the bleeding tumor has the advantages that it may obviate the need for a ventriculostomy if the obstructed CSF pathways can be reopened at operation. A further advantage is that resection of the tumor may prevent a second hemorrhage.

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Fever Caused by Leaking Atherosclerotic Abdominal Aortic Aneurysm

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Abstract

Two cases of leaking atherosclerotic abdominal aortic aneurysm are presented. The leakage caused fever and leukocytosis, combined with signs of peritoneal irritation. Blood hemoglobin levels were reduced. Both patients were initially treated for sepsis but within hours the cause was identified; both died in the operating theater. The experience of others is reviewed and the mechanism of fever caused by leaking aneurysm is discussed.

Leaking atherosclerotic abdominal aortic aneurysm is one of the most urgent surgical situations. Immediate diagnosis and surgical treatment are required for successful treatment. Diagnosis is obvious if the patient is complaining of abdominal or back pain, and a pulsating abdominal mass is found on examination. However, such a leaking aneurysm can cause various signs and symptoms which may delay the diagnosis and increase the rate of fatal outcome.

We report here two such cases of patients whose signs and symptoms, suggesting abdominal sepsis, diverted the attention of the treating physicians to an erroneous diagnosis, with a fatal outcome.

Case Reports

Case 1. A 66-yr-old man complained of shaking chills, fever, abdominal pain, nausea, and constipation for 3 days. His medical history included myocardial infarction 10 yr prior to admission.

On examination he had systolic blood pressure of 80 mm Hg, pulse 80/min, regular, temperature of 38.1°C per rectum and 36.4°C per os. The abdomen was flat, with tenderness and guarding over the left lower quadrant. All peripheral pulses were palpated.

Laboratory results showed hemoglobin of 9.0 gr%, white blood cell count of 20,000, and arterial blood pH of 7.39. Plain abdominal x-ray showed blurring of the psoas shadow on the left side.

For 5 hr the patient was thought to be in septic shock due to an inflammatory process involving the left colon, and he was resuscitated with 1,000 ml of crystalloids and 2 units of packed red blood cells. Blood pressure rose to 120 mm Hg systolic. Antibiotics were given intravenously. After 4 hr the patient became diaphoretic and his blood pressure decreased to 80 mm Hg systolic. Examination of the abdomen at that point showed a mass in the left lower quadrant. Ultrasonography of the abdomen showed atherosclerotic abdominal aortic aneurysm. The hemoglobin level at that time was 8.4 gr%. The patient was taken to the operating room, where a ruptured aneurysm was found within an expanding hematoma in the left retroperitoneum. The aneurysm was replaced with a tubular Dacron graft. Shortly after declamping, the patient became hypotensive and died.

Case 2. An 81-yr-old man complained of abdominal pain, nausea, and vomiting for 3 days.

His medical history included reduction of incarcerated hernia and nailing of hip fracture 3 yr prior to admission. The patient was known to suffer from organomental syndrome.

On examination the patient was confused.

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His temperature was 38.7°C per rectum and 37°C per os. Blood pressure was 85/40 mm Hg, pulse 110/min regular, abdomen was distended and soft with tenderness in the left lower quadrant, without guarding. Bowel sounds were diminished. Laboratory tests showed hemoglobin of 13.6 gr%, white blood cell count of 16,000, and arterial blood pH of 7.22. Microscopic examination of urine specimen revealed numerous white blood cells. The patient was thought to be in urosepsis and was treated by insertion of central venous line (central venous pressure was 6 cm H_2O), 2,000 ml of crystalloids, Foley catheter to the urinary bladder, and broad-spectrum antibiotics. During 8 hr of treatment in the intensive-care unit, the blood pressure was 90 mm Hg systolic and urine output 40 ml/hr. Repeated blood hemoglobin was 9.6 gr%. It was then noted that the abdomen was much more distended, with tenderness and guarding in the left lower quadrant. Abdominal paracentesis revealed blood.

The patient was transferred immediately to the operating room. Exploration disclosed a huge retroperitoneal hematoma and ruptured atherosclerotic aneurysm, 3 × 4 cm, in the infrarenal abdominal aorta. The patient died in the operating room shortly after clamping of the aorta. Blood culture taken on admission showed growth of *Clostridium perfringens*.

Discussion

Both patients described here had fever, hypotension, leukocytosis, and reduced blood hemoglobin levels. Abdominal examination revealed tenderness in the left lower quadrant, but no mass was palpated in the initial examination. Sepsis was diagnosed in both patients, caused by diverticulitis in one and urinary tract infection in the other.

In each patient, surgery was delayed until frank rupture of the aneurysm occurred; each died during the operation.

Lagaaij et al (1) described 100 patients with the same type of leaking aneurysm, 41% of them diagnosed initially as suffering from other diseases, mainly perforation or inflammation of intraperitoneal organs. Berne and Wilkinson (2) reported that in 74 patients with such a ruptured aneurysm, 19 (25%) were initially misdiagnosed. Graham et al (3) reported that among 107 such patients, 30 (28%) were treated initially for erroneous diagnosis.

Sink et al (4), after reviewing their experience and others in treating ruptured abdominal aneurysms, concluded that prompt diagnosis and surgical treatment before cardiovascular collapse occurs are most important to reduce the 52% mortality rate of this disease.

Fever caused by such leaking aneurysms is not mentioned in these reports. In 1959 Sommerville et al (5) described three autopsy cases of leakage into the retroperitoneum, in which the patients' initial symptoms were fever and abdominal or back pain. On autopsy, bacterial contamination within the wall of the aneurysm, as well as inflammatory changes, were noted.

Szilagyi et al (6) reported on seven patients with chills, fever, abdominal pain, leukocytosis, and lowering blood hemoglobin level caused by such a leaking aneurysm. Diagnosis in the hospital was delayed for 3–17 days (mean 7.3 days), and only one patient survived.

Szilagyi et al (6) believe that the mechanism by which such a leaking aneurysm can cause fever is intermittent leakage of blood from the aneurysm into the retroperitoneum. The escaped blood provokes the systemic reaction of fever and leukocytosis, while the leakage stops temporarily, creating a clinical picture of abdominal sepsis rather than hypotension and abdominal mass.

Sommerville et al (5) found, on autopsy, severe inflammation in the aortic wall and signs of bacterial infection. Szilagyi et al did not find any positive blood or tissue cultures among their group of patients. One of the patients reported on here had *Clostridium* in the blood culture on admission.

Schwartz et al (7) found positive culture of the aneurysm contents in 20% of patients operated on for ruptured aneurysm and 10% of patients electively operated on for aneurysm. Infection, inflammation, and blood leakage can all contribute to raise the body temperature of these patients.

The physical signs of leaking small aneurysms can be abdominal wall guarding and tenderness rather than a pulsating mass.

Signs of fever and left lower quadrant pain associated with hypotension and reduced hemoglobin level should alert the physician to the possibility of such a leaking aneurysm. The early use of ultrasonography and a high index of suspicion might prevent complete rupture of the aneurysm and increase the salvage rate of these patients.

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Mesenteric Fibromatosis in Gardner's Syndrome

Cristina Frexes Keusch, M.D., and Joel Bauer, M.D.

Abstract

Gardner's syndrome, first described in the 1950s, is a composite clinical entity characterized by intestinal polyps, osteomas, fibromas, and epidermal cysts. A case of mesenteric fibromatosis in Gardner's syndrome is presented.

Whereas most of the literature on this subject stresses the significance of the intestinal polyposis and its premalignant potential, in this paper the serious significance of the intraabdominal fibromas is stressed. This case demonstrates an unusual complication of erosion of this tumor into the small intestine, resulting in multiple intestinal fistulae with abscess formation. Surgical management of this problem necessitated resection of the fibroma and involved small intestine. A review of the literature is presented.

Familial polyposis was first described in the late 18th century and then characterized as a hereditary disorder in 1882 by Cripps (1). In the 1950s and early 1960s Gardner (2) published several reports based on a Utah family group which depicted what is now known as Gardner's syndrome. This includes multiple or diffuse intestinal polyps, osteomas, fibromas, and epidermal cysts. Gardner viewed the polyposis as the most serious aspect of the syndrome because of the high malignant potential of the polyps and their unrelenting predisposition to the development of adenocarcinoma of the colon and rectum.

Abdominal wall desmoid tumors and mesenteric fibromas have been identified in 29% of Gardner's original kindred. It is only in the past two decades that the serious significance of these "benign" tumors has been realized. Ureteral obstruction, small-bowel obstruction and perforation, short-bowel syndrome, and death are all possible consequences of these neoplasms when they are located in the abdominal cavity or the retroperitoneum. An illustrative case is reported here.

Case Report

The patient's mother had died of metastatic colon carcinoma in association with Gardner's syndrome. When the patient was 16 years old, a barium enema revealed polyposis of the colon. Subtotal colectomy with ileosigmoidostomy was performed at that time. The rectal segment was evaluated yearly by sigmoidoscopy. At the age of 20, the patient underwent surgical exploration for symptoms of small-bowel obstruction. Laparotomy revealed a retroperitoneal fibroma, but no resection was performed.

Six years later, proctectomy and ileostomy was required for extensive rectal polyposis. A large, multilobulated fibroma involving the base of the mesentery was noted. At age 29, three years later, the patient developed bilateral ureteral obstruction and small-bowel obstruction. Laparotomy was performed, at which time it was noted that the previously identified fibroma had become larger. Partial resection of the mass and an ileal side-to-side anastomosis was performed to bypass the obstructed segment of small intestine. In spite of Tamoxifen and Indocin therapy over the next 5 years, the fibroma increased in size.

At age 34, the patient developed severe abdominal pain, fever, and chills. Examination re-

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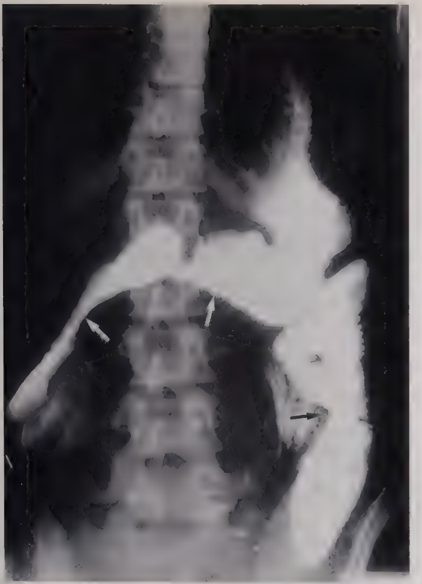


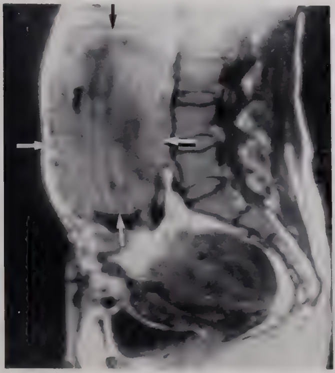
Fig. 1. Upper gastrointestinal and small-bowel series demonstrating mass effect but no communication between mass and small bowel.

vealed a distended abdomen with a palpable mass and localized tenderness. Temperature was 104°F rectally. Upper gastrointestinal and small-bowel radiography with barium demonstrated the mass but failed to reveal a communication with the small intestine (Fig. 1). Magnetic resonance imaging revealed a large, intraabdominal mass with abscess (Fig. 2). Percutaneous drainage relieved the sepsis only transiently. At laparotomy, two fistulae between the mesenteric fibroma and the jejunum were seen. No resection was performed. Instead, division of the fistulae and closure of the enterotomies were performed.

Approximately two months later, sepsis recurred. Reexploration with resection of the mesenteric fibroma and all encased small bowel was performed (Fig. 3). The patient was left with 5 ft of small intestine. The postoperative course was uneventful. Following discharge from the hospital, the patient continues to require home parenteral alimentation for nutritional support. The follow-up period is now 18 months.

Discussion

Desmoid, a term meaning hand- or ligament-like, was first viewed as an entity in 1828. The mesenteric form was first viewed as a variant of Gardner's syndrome by Simpson et al (3) in 1964. A general review of the reported cases was presented by McAdam and Goligher (4) in 1970. Forty-four cases of Gardner's syndrome with intraabdominal desmoids were cited. Forty-one occurred within the mesentery and 3 were entirely retroperitoneal. Review of the literature revealed most of these lesions (25 of 44) to be inoperable because of their mesenteric location. These authors stressed the propensity of these fibromas to cause complications or precipitate death because of their location and site. Wide excision, if possible, and removal of overlying bowel were rec-



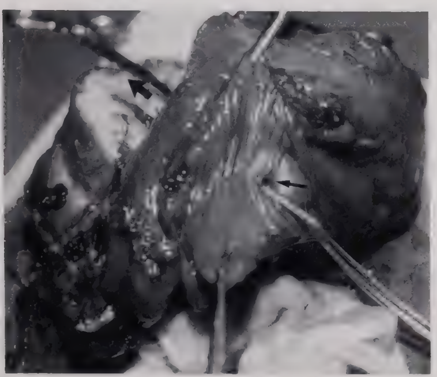


Fig. 2. **Left** Magnetic resonance imaging. Lateral view demonstrating retroperitoneal mass (arrows).
Fig. 3. **Right** Specimen with fibroma and jejunum opened demonstrating fistula between them.

ommended. Among those patients treated by resection, however, most sustained recurrences within a short period of time. Complications included hemorrhage, ureteral obstruction, sepsis, and pancreatic fistula. Intestinal fistulization by these fibromas was noted in our case, as well as one reported by McAdam and Goligher.

Other authors (5–8) have similarly noted this complication. Karakousis et al (9) in 1978 described successful excision of a mesenteric fibroma and overlying bowel. Pathologic examination of the specimen revealed two separate areas of perforation of the tumor into the small bowel. The patient remained well seven months postoperatively.

Kindred 109, from which Gardner's syndrome was first described, has 28 members to date. Eight of these (29%) had desmoid tumors or mesenteric fibromas or both. Four of these patients had mesenteric or retroperitoneal fibromatosis; three died with extensive disease leading to intestinal and ureteral obstruction. The fourth patient had successful resection of a fibroma in the gastrocolic ligament and was well nine months postoperatively.

The etiology of these fibromas and desmoids is unclear. It was originally thought that the lesions arose in postsurgical patients secondary to the trauma of the procedure. Richards et al (10), however, reported 2 patients in whom mesenteric fibromas were found in the absence of prior surgical procedures. Similarly, 1 of 28 patients of Kindred 109 exhibited spontaneous mesenteric fibromatosis.

The only satisfactory form of therapy for this entity is wide surgical excision with removal of a margin of healthy tissue around the tumor. This is, at best, difficult because of tumor location and the "invasive" way in which these "benign" tumors insinuate themselves around vital structures. Short-bowel syndrome, as reported by Gold and Macher (11), is one of the possible outcomes of radical surgery. The efficacy of radiotherapy, chemotherapy, and hormonal therapy has not yet been demonstrated (12, 13).

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Environmental Medicine Notes

Alf Fischbein, M.D., editor

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Asbestos-associated diseases continue to pose a major public health problem in the United States. They include both benign disorders, such as asbestosis and asbestos-related pleural abnormalities, and malignant conditions, primarily lung cancer and mesothelioma. The routine chest radiograph still constitutes the mainstay of diagnostic procedures in evaluating asbestos-related disorders.

One roentgenologic manifestation of asbestos-induced pleuropulmonary disease is presented in the following communication. The recognition and correct diagnosis of asbestos-associated rounded atelectasis is essential. The lesion is formed by thickened pleura and lung tissue. This benign condition often mimics a malignant lesion, and the correct diagnosis will therefore prevent the use of invasive surgical diagnostic procedures.—AF

Asbestos-Associated Rounded Atelectasis:

A Case Report and Review of the Literature

ALFRED FRANZBLAU, M.D.

Abstract

Asbestos-associated rounded atelectasis is a nonmalignant radiographic consequence of asbestos exposure that can mimic neoplasia. It is infrequently mentioned in reviews of the radiographic features of nonmalignant asbestos-associated disease. Distinguishing it from malignant disease without resorting to chest surgery is important. This report presents a case of such atelectasis, and a review of the relevant literature.

Because of the well-known increased risk of malignant disease among workers exposed to asbestos (1, 2), discovery of a lesion suggestive of neoplasm on the chest radiograph of an asbestos-exposed individual is a cause for considerable concern. Rounded atelectasis (RA) is a nonmalignant consequence of exposure to asbestos whose radiographic appearance can mimic neoplasia. Since the first report in 1966 (3), asbestos-associated rounded atelectasis has been described in a number of patients (4–9) under a variety of titles ("folded lung," "pseudotumor," "atelectatic pulmonary and pleural asbestotic pseudotumor," "pleuroma," "rounded atelectasis"). Investigators have identified characteristic radiographic features which may, in many cases, allow one to distinguish between asbestos-associated atelectasis and cancer. Despite this, the lesion either is infrequently mentioned in reviews of the nonmalignant or radiologic aspects of asbestos-associated disease (10–12), or is discussed only briefly (13, 14). To exclude malignant disease, patients with this condition may be subjected to thoracotomy in order to identify a benign disorder. Chest surgery may be particularly hazardous if the patient has significant underlying lung dysfunction.

To obviate the need for surgery, preoperative diagnosis of the lesion is a major goal of medical management. Previous reports suggest that in those patients who undergo thoracotomy, the findings at the time of surgery may be characteristic enough to avoid lobectomy, and thus preserve functional lung tissue.

In this report an atypical case of the condi-

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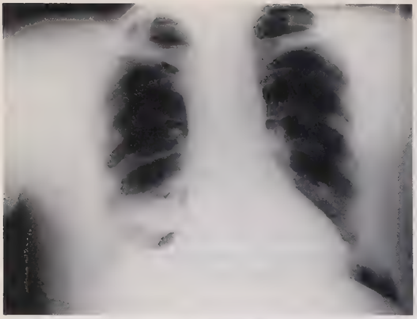

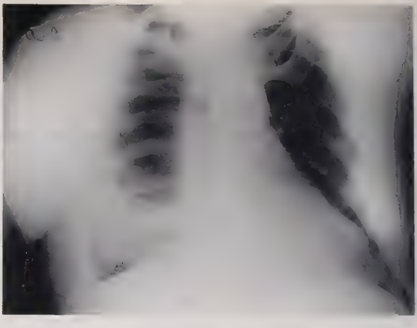

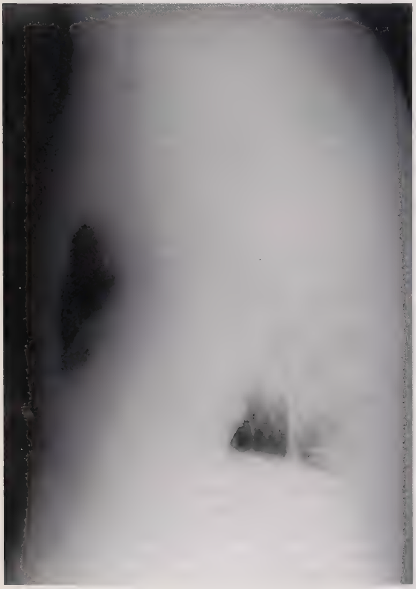

Fig. 1. Upper left Chest radiograph, posterior-anterior view.
Fig. 2. Lower left Lateral view.
Fig. 3. Above Right anterior oblique view.

tion is presented. This is followed by a review of the literature which emphasizes the radiographic, pathologic, and epidemiologic features of this condition.

Case Report

The patient is a 62-year-old white man who participated in a medical field survey of sheetmetal workers. The patient reported that he had unexpectedly lost 16 pounds during the three months preceding the evaluation. There was no history of pneumonia, tuberculosis, recent respiratory illness, cancer, unexplained fever, chest pain, cough, shortness of breath, or other chest conditions. He had smoked briefly, and then had given up tobacco use 32 years earlier. His exposure to asbestos probably began in 1943 when he started working in boiler rooms on board Navy ships. From 1946 on, he worked exclusively in the sheetmetal trade, and was still so employed at the time of examination in 1986. Review of his work history indicated ample opportunity for intermittent exposure to airborne asbestos during these years of construction work.

Physical examination of the chest was notable for a decrease in breath sounds and dullness to percussion over the right posterior lung base. No rales were audible over either lung field. The chest wall was not tender. The remainder of his physical examination was normal.

A density measuring 7 × 6 cm was visible in the right lower lobe on the posteroanterior projection of the chest radiograph (Fig. 1). On the lateral view (Fig. 2), the mass was less conspicuous but was visible in the posterior basilar area of the lower lobe and was observed to be pleural based. The lesion measured over 9 cm when viewed in the right anterior oblique projection (Fig. 3). A confluence of bronchovascular markings converging into the lesion (the "comet-tail" sign) was not visible. Other findings compatible with asbestos exposure were absent, except for slight blunting of the right costophrenic angle.

In a computed tomographic examination of the patient's chest (Fig. 4), extensive pleural thickening was visible throughout the lower posterior aspect of the right lung and was greatest near the lesion. The mass was pleural based, somewhat rounded, and projected into the lung parenchyma with a sharp angle. Other views (not shown) demonstrated the presence of aerated lung parenchyma between the lesion and the diaphragm.

Findings on blood tests, including complete blood-cell count, electrolytes, and routine blood chemistries, were all within normal limits. Pulmonary function testing suggested a restrictive ventilatory defect (forced expiratory volume in 1 sec, FEV_1: 1.92L, 67% of predicted; forced vital capacity, FVC: 2.61L, 75% of predicted; FEV_1/FVC, 73%; forced expiratory flow, mid-expiratory phase, 1.40L, 48% of predicted; total lung capacity, 4.25L, 75% of predicted).

Because of the history of extensive exposure to asbestos, recent weight loss, and findings on physical and radiographic examinations, a malignant tumor was suspected. Bronchoscopic examinations yielded no unusual diagnostic material. A right thoracotomy was performed. Pleural symphysis was discovered but the mediastinum appeared unremarkable. However, because of the preoperative consideration of malignancy, and the finding of unusual fullness around the bronchus at the right hilum, the surgeons elected to perform a right lower lobectomy. Histologic examination of the surgical specimen did not reveal evidence of tumor. The lung tissue demonstrated diffuse mild to moderate interstitial fibrosis. Rare asbestos bodies were present on optical microscopy and biopsies of pleural plaques were compatible with typical benign pleural fibrosis associated with asbestos exposure. The patient was discharged on the 12th postoperative day. Within three months he returned to work.

Discussion

Rounded atelectasis (not associated with asbestos) was described in the medical literature possibly as early as 1928 (15). In 1966 Blesovsky was the first to associate asbestos exposure with rounded atelectasis, a condition he aptly termed "folded lung" (3). Over 45 detailed descriptions of the asbestos-associated lesion have appeared in the literature (3–6, 8, 9).

The present case highlights a number of features of rounded atelectasis associated with asbestos exposure. There was a 43-year interval (latency) between the patient's initial exposure to asbestos and the discovery of the pseudotumor. Previous films of our patient were not available to help pinpoint the time course of development of his lesion. Hillerdal et al (5) addressed this issue explicitly. Their 10 cases had a mean latency of 37 years, with a range of 21 to 70 years after first exposure to asbestos. Asbestos exposures lasted from 2 to 52 years.

Although the patient whose case is presented here had histopathologic evidence of parenchymal and pleural fibrosis, these changes were not readily apparent on routine chest x-ray or computed tomography (CT) scan. This is unusual. Most patients with the condition have radiographic findings of pleural and/or parenchymal asbestosis (4, 5, 7, 8). Blesovsky (3) did not indicate whether the chest radiographs of his 3 cases revealed asbestotic changes, but at thoracotomy all 3 had plaques "commonly associated with asbestosis," as in the case reported here.

The diagnostic uncertainty was compounded in the patient reported on here by the history of significant weight loss. An interesting case report in this regard is that of a 56-year-old man with a long smoking history, a recent 16-pound weight loss, and a lingular mass on chest x-ray. Although asbestos was not mentioned, the description and diagram by the authors were characteristic of rounded atelectasis, even if their term, "twisted lingula" (16), was rather unusual.

The condition is a serendipitous finding in most reported cases, as it was in the report made here. The initial chest radiograph was obtained for reasons other than acute or chronic chest symptoms in more than 75% of cases in which the investigators gave reasons for obtaining an x-ray (3–5). Unexplained weight loss was not described among any of the asbestos-associated cases of rounded atelectasis. Since many of the patients in these reports had extensive asbestos exposure and definite pleural and/or parenchymal fibrosis on chest radiographs and/or CT, it is probably not surprising that some had shortness of breath or

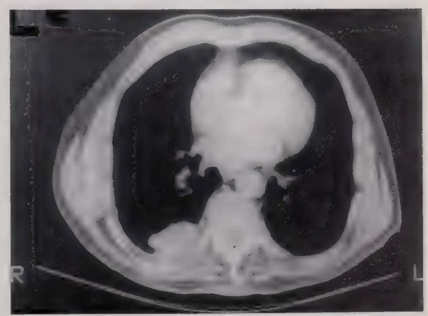

Fig. 4. Computed-tomographic scan.

nonspecific chest pain. These are symptoms associated with pleural and parenchymal fibrosis due to asbestos. The chest symptoms experienced by patients with asbestos-associated rounded atelectasis most likely are attributable to other parenchymal and pleural changes due to asbestos, and not to rounded atelectasis.

The radiographic manifestations in the case reported here were typical in some respects. The mass was rounded, pleural based in the right lower lobe, formed an acute angle with the pleura, and had aerated lung between the mass and diaphragm. A comet-tail sign, the finding that is most pathognomonic (6), was not present on any of his standard radiographs or CT scans. The mass was also unusually large, greater than 8 cm (6), and there were no radiographic features of asbestosis other than thickened pleura subadjacent to the mass. The CT scans were valuable in that they identified all of the above findings, plus the presence of extensive pleural thickening subjacent to the mass, albeit not elsewhere in the chest. Routine radiography and CT scan of the chest appears, in many cases, to permit identification without invasive procedures (17).

Most reports suggest that prior asbestos exposure is a very common cause of rounded atelectasis (4–6, 8). However, this experience has not been reported uniformly in recent publications (7, 15, 18). It is not clear why these differences exist among reports; incomplete occupational histories could have contributed to this difference.

In a radiographic survey of adults, Hillerdal (9) noted 6 cases of asbestos-associated rounded atelectasis among 891 individuals with pleural changes due to asbestos who were followed up for 10 years. Little or no evaluable information regarding exposure, latency, or age was provided in this report. Patients who had surgery for the condition prior to the initiation of this study, and those who developed the condition after the study ended presumably were not counted. Therefore, these numbers (6 of 891) provide only a minimum estimate of prevalence in a population with pleural abnormalities after asbestos exposure.

Location of the lesion is variable, though in over two-thirds of the cases described in the literature the lesions are found in the lower lobes, particularly in the basilar areas (3–6, 8). All reports that provide this information support the predominance of lower-lobe lesions, except for Hillerdal et al (5), in which 8 of 10 patients were found to have upper lobe lesions; 5 of these 8 were in the lingula.

Only three investigators provide a gross and histopathologic description of the lesion in a total of 12 cases (3–5). The lesion appears to be related to thickening of the visceral pleura with folding and/or atelectasis of the underlying trapped lung parenchyma. The parietal pleura invariably demonstrates fibrous changes (plaques or thickening) and may be directly involved with the lesion. The "pseudotumor" visible on radiographic examination is formed by thickened pleura and collapsed or "folded" contiguous lung. The visceral and parietal pleura may or may not be adherent. In 5 of 6 cases in which the surgical procedure was described, decortication was adequate treatment and the involved lung tissue appeared to reinflate (3, 4). As in the present case, histopathologic analysis of the involved pleura demonstrated fibrous tissue with nonspecific inflammatory changes.

A primary goal in the understanding of asbestos-associated rounded atelectasis is to distinguish benign radiographic lesions from malignancies without the need for surgery. Routine radiography, including oblique projections, and CT scan of the chest are the principal means of distinguishing the benign lesion from neoplasia. Nevertheless, diagnostic uncertainty will remain in some patients short of thoracotomy. If the benign lesion is anticipated as a diagnostic possibility, and if the operative findings are sufficiently characteristic, it may be possible for the patient to be treated with biopsy and decortication, and not be subjected to more extensive resection of the involved lobe (3, 4). This approach would beneficially serve to preserve potentially functional lung tissue in patients who may already suffer ventilatory impairment.

Acknowledgments

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Ophthalmology Notes *Keith M. Zinn, M.D., editor*

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Endogenous *Klebsiella* Endophthalmitis: Case Report

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Abstract

A case of endogenous *Klebsiella pneumoniae* endophthalmitis, cryptogenic in origin, is presented. It was treated initially with success, only to recur three months later with loss of the eye. Common sites of *Klebsiella* infection are reviewed. This organism rapidly destroys retinal photoreceptors. A link between *Klebsiella* and acute anterior uveitis has been suggested but is not supported by prospective data.

Endogenous bacterial endophthalmitis is a rare condition (1). Most cases of endophthalmitis can be traced to penetrating wounds, either surgical or traumatic. The incidence of bacterial endophthalmitis following intraocular operative procedures is 0.05% (1). The incidence of endogenous bacterial endophthalmitis is stated to be "only occasional" in comparison (1).

The clinical characteristics of endophthalmitis include sudden, severe pain and pronounced visual deficit. Examination may reveal lid edema, conjunctival erythema and chemosis, anterior chamber inflammation, hypopyon, ciliary injection, vitritis, chorioretinitis, and elevated intraocular pressure, possibly leading to corneal edema.

We report a case of *Klebsiella pneumoniae* septicemia with fulminant endophthalmitis. The endophthalmitis recurred three months after an apparent therapeutic success utilizing local, systemic, and intraocular antibiotics and pars plana vitrectomy.

Case Report

A 63-year-old white man was hospitalized because of two days of fever. His medical history was remarkable for remote cholecystectomy and appendectomy.

On admission, his temperature was 104°F and his pulse 120/min. The skin was cool and moist. Abdominal examination revealed tenderness and hepatomegaly. Six blood culture bottles all grew *Klebsiella pneumoniae,* sensitive to cephalothin, gentamicin, and cefotaxime. The evening after admission, he noted a painless decrease in vision, left eye. Ophthalmologic evaluation twelve hours later revealed best corrected visual acuities of 20/20 OD and hand motion in the temporal field OS. Intraocular pressures were 16 mm Hg OD and 14 mm Hg OS. The right eye was unremarkable. The left eye showed lid edema. The conjunctiva was erythematous and chemotic. The cornea was mildly thickened, with inflammatory debris on the endothelium. There was a 10% hypopyon. The iris was immobile. No fundus detail could be seen. Ultrasonography revealed vitreous exudates with a subretinal mass lesion temporal to the disc.

Periocular steroids and antibiotics were given. While the patient was being stabilized in the medical intensive care unit, intraocular cultures were taken and antibiotics administered.

Multiple hepatic abscesses were found and surgically drained. One week after admission,

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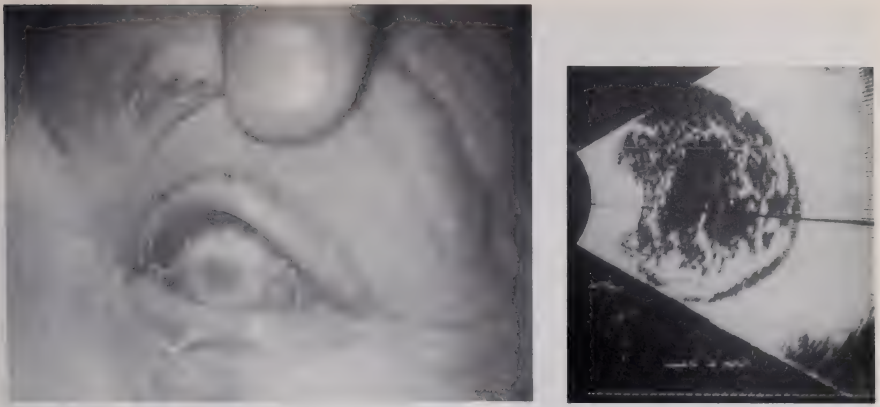

Fig. 1. Left External photograph of left eye prior to enucleation. Note abscess formation superiorly. **Right** B-scan ultrasonography reveals numerous dense vitreous echoes and choroidal thickening. Retinal detachment is present.

vitrectomy was performed with instillation of intravitreal, periocular, and intravenous cephalothin and gentamicin. Intravenous cefotaxime was also given. Cultures of ocular fluids had yielded no growth. The lens became cataractous and was removed intracapsularly seven days postvitrectomy.

The best corrected visual acuity in the left eye improved to 20/70. Three months after discharge, there was a recurrence of pain and purulent drainage from the left eye. Examination revealed an unremarkable right eye. Acuity in the left eye was light perception with temporal projection. Intraocular pressures were 14 mm Hg OD and 24 mm Hg OS. There was a 3-mm proptosis OS with motility restriction. The lids were edematous. The conjunctiva was erythematous and chemotic. There was a purulent discharge. The cornea was hazy with large keratic precipitates. There was a 20% hypopyon with a turbid aqueous humor. Vitreous haze obscured fundus detail. Ultrasonography revealed dense vitreous echoes, choroidal thickening, and retinal detachment with no orbital abscesses. Computed tomography confirmed the orbit not to be involved.

Vitreous washout with intravitreal, periocular, and intravenous instillation of cephalothin and gentamicin was performed. Intravenous cefotaxime was also given. Topical antibiotics were administered hourly. Vitreous aspirates grew out *Klebsiella pneumoniae*.

The following day, light perception was lost OS. The wound from the prior cataract surgery was opened and the eye was enucleated (Fig. 1).

Pathology. Gross examination of the enucleated eye showed it to be 25 × 23.5 × 24 mm with the optic nerve cut flush with the globe. The globe did not transilluminate. The cornea was nearly opaque. The wound at the 12-o'clock position had dehisced and an 8.5-mm mass of exudative material had been exteriorized (Fig. 2). The globe was opened vertically and showed a large abscess anteriorly with a total retinal detachment.

Microscopic Examination. The cornea showed abscess formation with large areas of necrosis, especially superiorly near the wound. The anterior chamber was filled with fibrinopurulent exudate. The iris was infiltrated with inflammatory cells. The posterior chamber and vitreous were filled with a sea of polymorphonuclear leukocytes. Some areas of necrosis were present amidst the inflammatory cells. The retina was completely detached, and in one area the abscess had involved the retina. Intraretinal hemorrhages were present in many areas, and perivascular cuffing by inflammatory cells was quite prominent. The choroid showed a nongranulomatous inflammatory reaction. Hopp's modification of the Gram stain showed innumerable gram-negative rods throughout the interior of the eye (Fig. 3).

Discussion

The most commonly encountered causative organisms in endogenous bacterial endophthalmitis include *Streptococcus pneumoniae* (2),

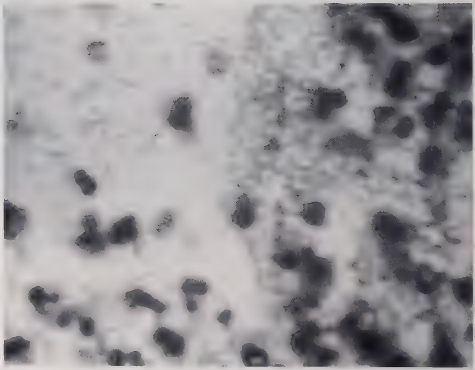

Fig. 2. Left Gross photograph of enucleated eye reveals dehiscence of wound with purulent exudate.
Fig. 3. Right High-power photomicrograph of vitreous exudate shows numerous neutrophils and gram-negative rods (Gram stain, Hopp's method, original magnification ×850).

Strep. viridans, Pseudomonas aeruginosa, and *Staphylococcus aureus* (3).

Klebsiella pneumoniae endophthalmitis is a distinctly uncommon entity. This is the eighth reported case (6–8). *Klebsiella pneumoniae* is a small, nonmotile, indole-negative, encapsulated gram-negative bacillus. It is part of the normal oropharyngeal and gastrointestinal flora. Usual sites of infection with this organism include the biliary tract, urinary tract, peritoneal cavity, and respiratory tract (4). In four of the previously reported cases, the source of septicemia was the hepatobiliary tract (5–7), and one case was traced to a perinephric abscess (8).

Klebsiella is usually sensitive to cephalothin. Other antibiotics of use in this condition include aminoglycosides, chloramphenicol, and tetracycline (4).

Klebsiella is a particularly damaging organism to the eye. Its cell wall has been implicated as an endotoxin. If *Klebsiella* endophthalmitis is to be dealt with successfully, intervention must be immediate (5). Experimentally induced *Klebsiella* endophthalmitis in a rabbit model revealed destruction of retinal photoreceptors 24 hr after inoculation. Rabbit eyes examined two weeks after infection showed severe disarray of retinal architecture as well as optic neuritis (9).

It has been suggested that the presence of *Klebsiella* organisms can trigger the onset of acute anterior uveitis. Certain *Klebsiella* species cross react with HLA B-27(+) lymphocytes. Furthermore, it has been demonstrated that patients with ankylosing spondylitis and acute anterior uveitis have a higher rate of fecal carriage of *Klebsiella* (10). However, in a prospective study of acute anterior uveitis patients, no particular link could be established with the presence or absence of fecal *Klebsiella* organisms (11).

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Sonographic Findings in Necrotizing Enterocolitis with Paucity of Abdominal Gas as the Initial Symptom

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The classic presentation of necrotizing enterocolitis is dilated bowel containing intramural gas. Rarely, the patient may have a paucity of intestinal gas as the initial finding, and if the clinical findings are also not specific, the diagnosis can be quite confusing (1). In this report we describe three patients with this rare initial picture. However, subsequent sonographic studies revealed certain features that helped clarify the diagnosis. Each patient had slightly different pathologic as well as sonographic findings.

Case Reports

Case 1. This full-term male infant was feeding well until the second day of life, when he was found to be pale and had guaiac-positive stools. The abdomen was soft and not distended. An abdominal radiograph showed paucity of gas in the abdomen; gas was seen only in the stomach. Portable ultrasound examination of the abdomen revealed no evidence of peritoneal fluid. The normal sonographically appearing bowel loops, linear and tubular, were not identified. The intestine was noted to have an inhomogeneous soft-tissue sonographic picture equal in echogenicity to the liver, and more echogenic than the kidney. Poor delineation between the loops of bowel was seen. The border between the bowel and the liver or spleen was obliterated. The lumen of the gut was not identified, and only a few scattered bright echoes of intraluminal gas were seen in the duodenum (Fig. 1).

The sonographic picture was related to extensive bowel-wall thickening and edema due to an inflammatory transmural bowel process. The diagnosis of necrotizing enterocolitis was suggested. Treatment consisting of antibiotic and withholding of feedings was begun. An abdominal radiograph the next day showed pneumatosis intestinalis, substantiating the diagnosis of necrotizing enterocolitis (Fig. 1). The patient did well clinically but received parenteral nutrition for 28 days because of a continuing abnormal abdominal gas pattern on abdominal radiographs. The infant was discharged 34 days after delivery.

Case 2. This premature female infant weighed 830 g at birth at the gestational age of 31 weeks. At birth, the infant was noted to be cyanotic and to have bradycardia. Respiratory distress required intubation and a respirator. On the fourth day, heart failure was noted, with increasing weight and a heart murmur. The next day the patient developed other complications, including acute renal failure, abdominal distention, blood diarrhea, and thrombocytopenia. The general clinical picture was that of septicemia, and antibiotic treatment was started.

Radiographs of the abdomen showed absence of intestinal gas except in the stomach (Fig. 2). A portable sonogram revealed gasless loops of bowel and a small amount of intraperitoneal fluid in Morrison's pouch. The loops of bowel were fixated and showed a serpiginous bright echogenic pattern (Fig. 2). Highly echogenic particles were observed in the portal vein radicals and were believed to be gas. This finding suggested

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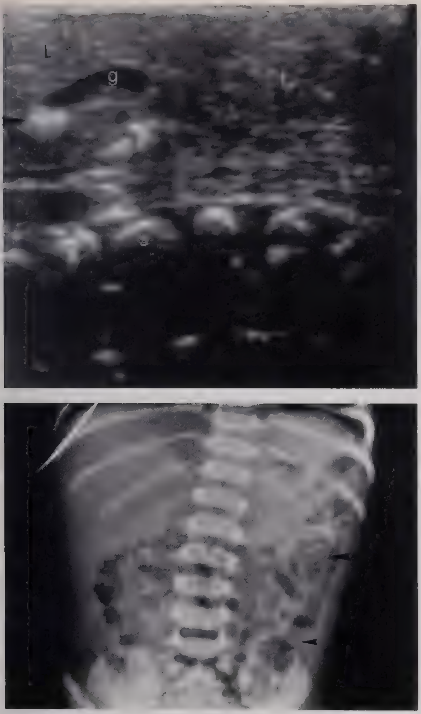

Fig. 1. **Top** Longitudinal abdominal scan at level of gallbladder (g) illustrates soft tissue appearance of bowel loops (I). Border between liver (L) and intestine is obliterated. Small amount of gas is seen in duodenum (arrow). s, spine. **Bottom** Abdominal radiograph obtained the next day reveals small rounded and linear lucencies of bowel wall (arrows) which represent pneumatosis intestinalis.

the diagnosis of necrotizing enterocolitis. A head sonogram done at the same time showed an area of increased echogenicity in the left temporal lobe consistent with an acute intracerebral hematoma. Fresh blood was also seen in the endotrachial tube. Bluish discoloration of the abdominal skin was noted, with no evidence of bowel sounds. The sonographic appearance of the intestine was attributed to intramural and intraluminal bleeding and edema, as manifestations of disseminated intravascular coagulopathy. The clinical status continued to deteriorate and the neonate died on day 10 in severe heart failure and shock. The parents refused autopsy.

Case 3. This full-term male infant of 2,180 g was admitted to the neonatal intensive care unit because of low birth weight and was treated with oral formula feedings. The neonate did well until day 9, when he developed abdominal distention and bloody stools.

Abdominal radiographs showed dilation of loops of bowel and pneumatosis intestinalis. Findings were consistent with necrotizing enterocolitis. The infant was given antibiotics and oral feedings were stopped. During the following four weeks, the infant did well clinically except for two episodes of abdominal distention. Repeated abdominal radiographs in the fourth week revealed dilated loops of bowel with focal paucity of gas in the right lower quadrant (Fig. 3). The possibility of abscess formation secondary to perforation was considered. A portable abdominal sonogram showed no evidence of fluid collection or masses. An abnormal aperistaltic fixed loop was seen. The bowel wall was concentrically thickened hypoechoic, and central echogenicity produced by the mucosa and intraluminal contents was present. The sonographic picture was that characteristic of a "pseudokidney" (Fig. 3). Barium enema done on the same day revealed a stenotic short colon extending from the splenic flexure to the cecum. In the ascending colon, there were tiny pockets of extraluminal barium that represented small walled-off perforations. The following day the infant had surgery; an 8-cm stenotic segment of colon was resected and Brook's ileostomy was performed.

The histologic findings of the resected colon were that of resolving inflammation consistent with chronic necrotizing enterocolitis with stricture formation. The final anastomosis was successfully performed when the infant was aged ten months.

Discussion

Dilated small and large bowel, pneumatosis intestinalis, and gas in the portal system are the predominant characteristic and diagnostic features of necrotizing enterocolitis. In general, when these findings are apparent, no further studies are required to establish the diagnosis. However, absence of gas on abdominal radiographs is occasionally found and when associated with an unclear clinical picture, presents a diagnostic dilemma. The relative absence of gas in the abdomen, however, provides an acoustic window and in this situation the ultrasonographic examination may prove to be of vital importance and diagnostic (2). In fact, the ultrasound studies may even help in analyzing the various stages of necrotizing enterocolitis.

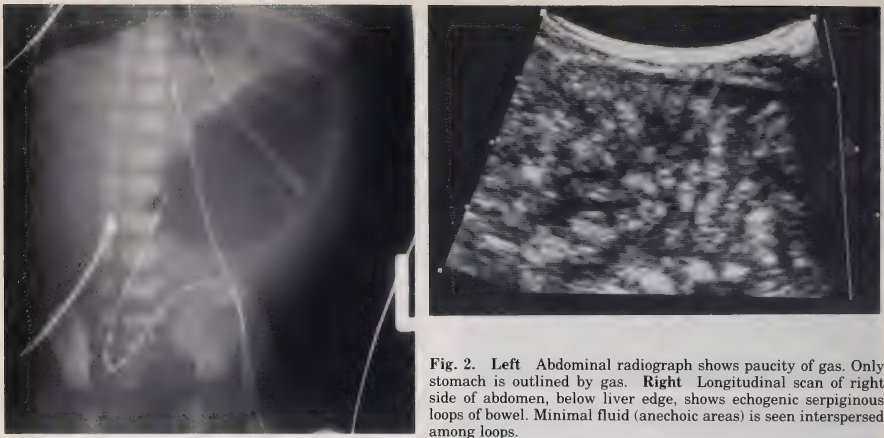

Fig. 2. Left Abdominal radiograph shows paucity of gas. Only stomach is outlined by gas. **Right** Longitudinal scan of right side of abdomen, below liver edge, shows echogenic serpiginous loops of bowel. Minimal fluid (anechoic areas) is seen interspersed among loops.

Loops of bowel are normally visualized ultrasonographically as thin-walled fluid-filled tubes with an echogenic lining produced by the mucosa. They are multifaceted and compliant, and the intraluminal fluid allows visualization of the valvulae conniventes and haustral sacculation (3). In the early stages of necrotizing enterocolitis, the bowel wall becomes thick and swollen due to the presence of edema and inflammatory changes (2). As a result, the echogenicity of the bowel increases. Extensive bowel wall thickening causes loss of the normal sonographic appearance of the intestine; the bowel loops are indistinct and inhomogenous, with an echo texture similar to the solid abdominal organs.

The major pathologic finding in acute necrotizing enterocolitis is hemorrhagic infarction. As a result, transmural necrosis occurs with mucosal ulceration and the formation of pseudomembranes. Gas cysts appearing as pneumatosis intestinalis on radiography occur in 60% of the cases and are localized initially to the submu-

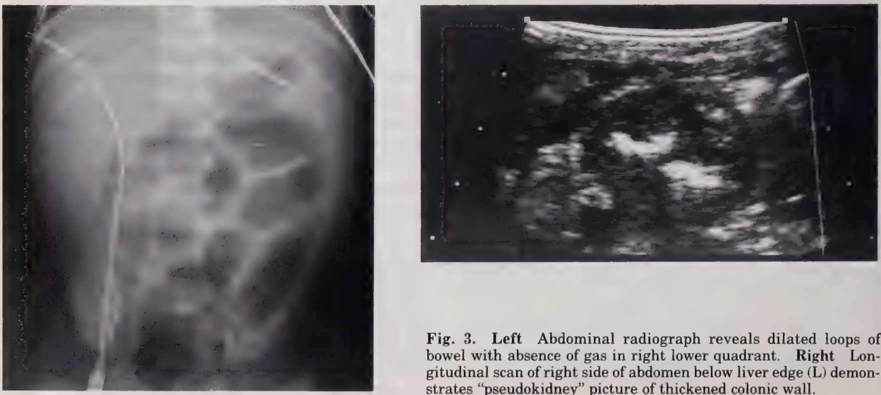

Fig. 3. Left Abdominal radiograph reveals dilated loops of bowel with absence of gas in right lower quadrant. **Right** Longitudinal scan of right side of abdomen below liver edge (L) demonstrates "pseudokidney" picture of thickened colonic wall.

cosa. However, as the disease progresses, the gas eventually penetrates the entire bowel wall (4, 5). Of note was that pneumatosis could not be detected on the initial radiographs in case 1.

Infiltration of the mesentery with blood or fibrous tissue will cause stiff and aperistaltic-appearing bowel loops. This picture was demonstrated in case 2 with extensive gastrointestinal hemorrhage and in case 3, where chronic inflammation and fibrosis were present.

The healing phase of necrotizing enterocolitis consists of epithelization with fibrosis and granulation tissue formation. Irreversible stricture formation develops when the submucosa and the muscularis are replaced by fibrotic tissue (6, 7). As a result, the thickening of the bowel wall causes obliteration of the lumen and bowel obstruction.

In summary, real-time sonography is a noninvasive modality that may prove useful in diagnosing necrotizing enterocolitis when the clinical and radiographic features are not clear. Moreover, by depicting the events occurring in the bowel, it may prove to be of value in predicting clinical outcome.

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Student Corner

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Intestinal Endometriosis and Its Complications: Case Report and Review

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The first report of endometriosis involving the colon was made by Rokitansky in 1860 (1). In 1909, Meyer described an endometrioma causing bowel obstruction which was treated by resection (2). In a 1955 review, Kratzer and Salvati (1) cited 225 cases of endometriosis, 77 (34%) of them demonstrating bowel involvement. In two cases (0.9%), intestinal obstruction was present. Macafee and Greer (3) reviewed 7,177 cases of endometriosis reported in a 30-year period and found that in 800 cases (12%) the bowel was involved. In their review, the incidence of intestinal involvement with endometriosis ranged from 3% to 34%. The sites of involvement were sigmoid colon and rectum (72%), rectovaginal septum (13%), small bowel (7%), cecum (3.6%), and appendix (3%). Since that 1960 review, there have been many scattered reports of endometriosis involving the intestines in both the surgical and gynecologic literature (4–6, 9, 12).

Case Report

A 61-year-old woman was admitted to the hospital with a 2-day history of vomiting, inability to eat, loose bowel movements, and pain in the left midabdomen. In 1978, she was diagnosed as having intestinal endometriosis following exploratory laparotomy and biopsy of an abdominal mass that had caused intestinal obstruction. A duodenojejunostomy was performed to relieve the obstruction. The patient was well until April 1986, when she was again hospitalized for partial small-bowel obstruction. Flat and upright x-rays of the abdomen showed a markedly dilated proximal small bowel with air in the rectum. A barium-contrast upper gastrointestinal series demonstrated dilatation of proximal duodenum and an irregular lobulated soft mass narrowing the third portion of the duodenum; barium did not pass this lesion. Endoscopic study revealed an extrinsic mass compressing the distal duodenum; mucosa was normal in appearance. The patient remained in hospital for 1 month and was treated with Cantor tube decompression because she refused surgery.

She was readmitted 4 days after discharge and again treated with nasogastric tube decompression for 1 week.

Two weeks after discharge, she returned, complaining of vomiting, inability to eat, loose bowel movements, and pain in the left midabdomen. On physical examination, her abdomen was mildly distended with hypoactive bowel sounds and tenderness in the left midabdomen. There were no palpable masses, and no rectal abnormalities were noted. Chest x-ray, electrocardiogram, and laboratory results were all within normal limits.

An exploratory laparotomy and secondary duodenojejunostomy were performed. The original duodenojejunal bypass was obstructed by adhesions and fibrosis from previous endometriosis. The patient's postoperative course was complicated by generalized ileus, but she recovered and was discharged, tolerating a regular diet.

Discussion

Endometriosis is an abnormal growth of endometrial tissue at an extrauterine site, usually the pelvic peritoneum or reproductive organs. Several theories have been advanced on the etiology of endometriosis. The metaplasia theory

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suggests that undifferentiated coelomic epithelial cells remain dormant on the peritoneal surface until the ovaries begin to function. Subsequently, they respond to cyclic hormonal stimulation in a manner similar to that of normal endometrial cells (7). Sampson proposed that endometriosis is caused by retrograde transport of menstrual fluid and tissue from the uterus through the tubes at menstruation. This allows for implantation of endometrial tissue in the peritoneal cavity and on the peritoneum (8). The occurrence of endometriosis in nonpelvic sites, such as lungs, pleura, umbilicus, old wound scars, and the gastrointestinal tract, is best explained by systemic metastasis; pieces of endometrial tissue embolize through venous and lymphatic channels to distant sites (9). No single theory can account for the existence of endometriosis at all reported sites. Thus, it is likely that more than one mechanism is involved in different circumstances (10).

Although endometriosis is a benign condition, it has certain characteristics resembling malignancy: It can distort pelvic and abdominal structures and can disseminate to distant sites. Since the growth and proliferation of this ectopic endometrial tissue is hormone dependent, it is most commonly encountered in women between menarche and menopause. Croom et al estimated that endometriosis develops in 8% to 15% of all women, and that in 3% to 37% of these, the intestine is involved (9).

The development of intestinal endometriosis is the result of implantation of endometrial tissue on the intestinal serosa and subsequent cyclic proliferation under hormonal stimulation. The menstruation that occurs in this ectopic tissue results in the presence of free fresh blood in the peritoneal cavity. Although the invading endometrial tissue may extend into the intestinal wall, it does not usually reach the mucosa and thus, rectal bleeding is a rare occurrence (2, 5). A reactive fibrosis develops on the serosal surface and may involve surrounding pelvic structures as well as adjacent loops of bowel. Stricture formation secondary to fibrosis and extensive adhesions account for the majority of symptoms and complications from intestinal endometriosis (9).

The commonest site of intestinal endometriosis is the sigmoid colon and rectum (72%), followed by the small bowel, cecum, and appendix (3). The most common symptom is recurrent crampy lower abdominal pain. Involvement of the distal colon or rectum may produce constipation, diarrhea, rectal discomfort during defecation, tenesmus, small-caliber stools, abdominal distention, and occasionally rectal bleeding. Involvement of the colon proximal to the sigmoid is rare. Endometriosis involving the small intestine is often asymptomatic and discovered incidentally at laparoscopy. It is usually found in the distal ileum, where extensive disease may lead to adhesions and subsequent bowel obstruction, with symptoms of abdominal distention, pain, nausea, and vomiting. Appendiceal endometriosis is often asymptomatic, but it may produce symptoms similar to those of acute appendicitis (11). Right lower quadrant pain, tenderness, guarding, moderate fever, leukocytosis, nausea, and vomiting may lead to an operation for suspected appendicitis. Endometrial implants of the cecum or appendix may also serve as lead points for intussusception (2, 6, 7, 9, 10, 12).

Differential Diagnosis. Boles and Hodes (11) summarize the differential diagnosis of endometriosis thus: "In the acute form, endometriosis may resemble appendicitis or terminal ileitis. In its more chronic form, the clinical picture may be difficult to distinguish from diverticulitis or carcinoma." Other considerations in the differential diagnosis are carcinoid tumor, benign intramural tumors, metastasis from occult malignancy, amebiasis, and pelvic or mesenteric tumors or cysts (11).

Accurate diagnosis begins with a careful clinical history and a high index of suspicion. Intestinal endometriosis usually affects women of childbearing age who have delayed childbirth or are of low parity. Most give a history of unexplained infertility, dysmenorrhea, and dyspareunia (9, 10). Careful questioning may reveal intestinal symptoms that are cyclic in nature, appearing or worsening just before or during menses. These include loose stools, constipation, dyschezia, distention, and symptoms of partial or complete obstruction, including nausea, vomiting, and crampy pain (10, 13). Significant weight loss is uncommon, a significant fact in the presence of symptoms suggestive of neoplasm (3, 9). Physical findings characteristic of endometriosis which may be present include pelvic nodularity and thickening or induration of the uterosacral ligaments and cul-de-sac.

Evaluation. Diagnostic studies should include barium enema, gastrointestinal series, colonoscopy, and computed tomography (CT) or ultrasonography. Barium studies typically reveal extrinsic compression, a long filling defect, stricture, or in some cases complete obstruction. Although mucosal destruction is not present, irregularity may be, and may suggest inflammatory disease. Colonoscopy may reveal narrowing of the

TABLE

Clinical and Radiologic Features of Intestinal Endometriosis and Colon Carcinoma

	Endometriosis	Carcinoma coli
Age	25–45 years	40–60 years
Sex	Female	65% male
Weight loss	None or minimal	Marked
Constipation	Intermittent, associated with menses	Progressive; short duration
Blood in stool	Rare; if present, only with menses	Frequent
Fertility	Low parity or infertile	Children
Dysmenorrhea	Frequent, progressive	No relationship
Proctoscopy	Intact mucosa, no bleeding	Gross ulceration and bleeding
Barium enema	Long filling defect, intact mucosa	Short filling defect, irregular mucosa
	Inconstancy of filling	Constant filling defect
	Fixation of bowel with tenderness	Fixation and tenderness absent

Adapted from Jenkinson and Brown (18) and Kratzer and Salvati (1).

lumen with intact, but red and congested, mucosa. During menstruation the degree of stenosis may be more marked, and bluish submucosal discoloration may be apparent. A gastrointestinal series may demonstrate complete or partial obstruction, disordered bowel motility, slow barium transit, and changes consistent with inflammation. CT or ultrasound is useful in providing the location and size of endometriomas.

Owing to the "malignant behavior" of this condition, it is often difficult to differentiate from colon carcinoma. The most important distinguishing feature of endometriosis is the temporal relationship of symptoms to menstruation. In addition, significant weight loss and rectal bleeding are not characteristic of endometriosis and when present suggest neoplasm. In the presence of colon cancer, barium studies characteristically produce a short, sharply demarcated filling defect with mucosal destruction, and colonoscopy will often reveal ulceration and bleeding. (See Table.)

Treatment. A variety of medical and surgical therapies are available for women with intestinal endometriosis. In fact, in view of the fact that pregnancy is known to have a beneficial effect on endometriosis, women can produce their own "biologic cure" by becoming pregnant. The choice of treatment modality depends on the age, parity, endocrine status, and childbearing attitude of the patient.

Kistner (14) suggests the use of estrogen and progesterone and has reported improvement of symptoms in 80% of patients. Danazol, an antigonadotropic agent, has been successfully used in the treatment of endometriosis. Discontinuation of the drug, however, often results in recurrence of disease (15). More recently, the use of GnRH analogs to induce complete suppression of gonadotropic activity has been successful in the treatment of this entity (10).

Medical therapy as described above, which produces a state of pseudopregnancy or pseudomenopause, can alleviate some of the symptoms of endometriosis. In cases of bowel involvement, underlying fibrosis and extensive scarring are likely unrelieved by hormonal therapy (16). This provides the basis for the presence of significant bowel involvement in postmenopausal women, as in the case presented above in this paper.

The incidental finding of endometriosis of the intestine in an otherwise asymptomatic patient does not require bowel resection (17). Resection of serosal implants has been successfully reported and is recommended (4, 13). In the presence of symptomatic intestinal endometriosis, resection of the involved segment is the treatment of choice. When this occurs in a woman who does not want future pregnancy, or in a woman who is peri- or postmenopausal, resection along with total abdominal hysterectomy and bilateral salpingo-oophorectomy is the only succcessful mode of treatment (9, 16). Cases of recurrent disease after bilateral oophorectomy have been reported because of peripheral conversion of androstenedione to estrone in the obese patient and the injudicious use of estrogens (13). For the symptomatic premenopausal woman desiring children, resection of involved intestine along with removal of pelvic lesions may be the treatment of choice (9). When total abdominal hysterectomy and bilateral salpingo-oophorectomy have been performed, postoperative estrogen is not advisable because it may lead to proliferation of residual endometrial tissue (15). Endometriosis involving only the appendix requires a simple appendectomy.

Summary

Endometriosis affects 8%–15% of all women, and of these 3%–37% have intestinal involvement. Affected women are typically of childbearing age and of low parity, with a history of cyclic abdominal pain and progressive dysmenorrhea. Endometriosis may involve the rectum and sigmoid, ileum, cecum, and appendix, generating symptoms suggestive of acute obstruction, appendicitis, ileitis, diverticulitis, or colonic carcinoma. Thus, this entity should be included in the differential diagnosis of recurrent abdominal pain and other episodic bowel symptoms in women of childbearing age.

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Student Corner

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New Directions in the Management of Zollinger-Ellison Syndrome: A Case Study and Review

Stephen Zuckerman, M.D.

In their original report, Zollinger and Ellison described an ulcerogenic tumor of the pancreas that was characterized by a triad of peptic ulcerations frequently found in atypical locations, extreme gastric hypersecretion, and non-beta islet cell tumors of the pancreas. This remains an accurate description. It became apparent that this tumor produced such large volumes of gastric juice that truncal vagotomy, radical gastric resection, and irradiation of the remaining fundus of the stomach were all ineffective in its cure, and only removal of all acid-secreting surfaces of the stomach by total gastrectomy was effective. This procedure became the standard treatment for the Zollinger-Ellison syndrome, and although considered radical, it saved the lives of patients who suffered recurrent peptic ulceration, perforation, and hemorrhage.

Until recently surgeons generally agreed that total gastrectomy was still the treatment of choice. However, the development of histamine receptor blockers raised the question of need for this extensive surgical procedure with its significant morbidity and mortality. Although opinions vary, two main treatment choices have emerged for patients suffering from this syndrome when the patient does not have an isolated gastrinoma (1): (a) preoperatively administered H_2 blockers followed by less-than-total gastrectomy, truncal vagotomy, and postoperative H_2-blocker therapy, and (b) preoperatively administered H_2 blockers followed by highly selective vagotomy plus postoperative H_2-blocker therapy. Excision of an isolated gastrinoma is the treatment of choice if one is localized at surgery. A patient with Zollinger-Ellison syndrome treated with this conservative regimen is reported.

Case Report

A 27-year-old woman was admitted to The Mount Sinai Hospital with a complicated medical and surgical history which included a 1962 left nephrectomy for Wilms' tumor treated with standard doses of radiation therapy; an intestinal resection for a perforated jejunal ulcer in November 1987 (biopsy consistent with radiation enteritis); and an exploratory laparotomy in March 1988 for suspected obstruction.

In May 1987, the patient began to lose weight, vomit several times daily, and suffer steady periumbilical pain accompanied by watery diarrhea. She was admitted to another hospital where an upper gastrointestinal series, barium enema, and gastroscopy were performed and a tentative diagnosis of Crohn's disease was made. She was treated with low-dose steroids and after release she did well for several months.

In November 1987 she was admitted to the Mount Sinai Hospital with symptoms suggesting a perforated ulcer. Emergency surgery that included resection of a short segment of jejunum was performed. Pathologic reports were consistent with radiation enteritis and the patient's treatment regimen was not altered. Upon release, vomiting returned and worsened, and by March 1988 the patient was readmitted to the hospital. An upper gastrointestinal series at this time showed narrowing of the duodenum and je-

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junum; an exploratory laparotomy was performed for possible obstruction. At surgery, no evidence of obstruction was found. Biopsies taken of the omentum were negative.

The possibility of Zollinger-Ellison syndrome was raised at this time. Serum gastrin levels were markedly elevated (315 pg/ml) and the patient had a positive secretin test. Attempts to localize the tumor preoperatively were undertaken. Computed-tomography (CT) scan and angiography were negative. Selective portal venous sampling for gastrin showed a gradient from the head and tail of the pancreas (620 pg/ml), possibly indicative of multiple gastrinomas.

The patient was admitted to the hospital for possible surgical resection in June 1988 in good condition without any physical complaints. Her medication regimen at that time included 10 mg of prednisone and 1,200 mg of ranitidine daily. Physical examination was normal. There was no history of endocrinologic disorder. Routine laboratory examination was significant for a hematocrit of 27.6, and the patient received one unit of packed red blood cells.

The surgical plan was to attempt excision of a localized gastrinoma, but if none were found, a conservative procedure would be performed. At surgery, the abdomen was opened and the duodenum was carefully palpated in attempts to locate a carcinoid-type gastrinoma within the duodenal wall. No evidence of such a tumor was found. The transverse colon was elevated and the upper jejunum inspected for evidence of ulceration. None was seen. There was no evidence of metastatic disease to the liver. The greater omentum was detached from the transverse colon in order to enhance the exposure of the pancreas. Two tumors, one on the surface of the head and the second on the surface of the tail, were evident. They were carefully resected and sent for frozen section. The pancreas was completely mobilized for inspection and bimanual palpation. No additional tumors could be palpated and intraoperative ultrasonography was negative. An enlarged peripancreatic lymph node was excised and sent for frozen section.

Intraoperative frozen section report showed the peripancreatic tissue to contain metastatic disease, but the pancreatic tissue biopsies were negative, showing only fibrotic tissue. A truncal vagotomy and pyloroplasty were performed.

The postoperative course was uneventful. At one week, the serum gastrin level had fallen to 210 pg/ml but continued to be elevated above normal range. The patient was discharged to be followed up with basal acid output and maximal acid output determinations in order to carefully titrate her need for histamine receptor blockers.

Discussion

Zollinger-Ellison syndrome is a non-beta islet cell tumor of the pancreas producing gastrin. This gastrinoma results in fulminant and often complicated peptic ulcerations secondary to extreme gastric hypersecretion. In 90% of patients, the clinical picture is active peptic ulcer disease and its relevant complications—hemorrhage, perforation, and obstruction. For 10% of patients, the clinical picture is atypical (2). Ulceration, although most typical in the first portion of the duodenum, occasionally is found in unusual locations, such as the third and fourth parts of the duodenum or jejunum. Any complication of jejunal ulceration should make one suspect the presence of an ulcerogenic pancreatic tumor, since ulceration at this site rarely occurs when no tumor is present. Ulceration that recurs after ordinarily effective surgical therapy should also raise the prospect of Zollinger-Ellison syndrome. Subtotal gastrectomy with or without vagotomy, radiation therapy, vagotomy with a drainage procedure, and large doses of alkalinizing and anticholinergic agents have all been ineffective in controlling this disease.

The peptic ulcer disease is associated with voluminous, watery diarrhea in about one-third of all reported patients (3). Steatorrhea may also occur and is probably caused by the inactivation of pancreatic and intestinal lipase by the abnormally acid environment of the upper small intestine, which also precipitates bile salts and irritates and inflames the mucosa of the small bowel.

In 75% of patients the ulcer is located in the duodenum. In the other 25%, the site is unusual—esophagus, stomach, or small bowel (4). In 50% of patients there is one tumor in the pancreas, in 29% there are two or more pancreatic tumors, and in 19% there are multiple pancreatic tumors. According to Schwartz (3), who reviewed 249 collected cases, 60% of the patients had malignant tumors. The tumors are located with equal frequency in the head and tail of the pancreas, diffuse microadenomatosis being observed in 20% of all patients.

Diagnosis. An elevated serum gastrin level in the presence of a high level of hydrochloric acid in the stomach confirms the diagnosis of gastrinoma. Zollinger (4) advises taking two fasting serum gastrin levels, combined with measurement of acid in the gastric juice as well as serum calcium levels, because elevation of the serum calcium tends to elevate the serum gastrin levels. One must also rule out achlorhydria, pernicious anemia, atrophic gastritis, and renal failure as the source of elevated gastrin. When the fasting serum gastrin level is only modestly elevated, a secretin test should be performed. There is a paradoxic rise in serum gastrin after secretin infusion in patients with the Zollinger-Ellison syndrome. An exaggerated response of the serum gastrin to the intravenous infusion of calcium also occurs. Marks et al (3) have suggested that a ratio of basal acid output to histamine-stimulated (pentagastrin) maximal gastric output of greater than 60% is virtually diagnostic of this condition.

Before surgery, attempts are made to localize the gastrinoma. A CT scan can accurately detect 50% of gastrinomas, particularly those greater than 2 cm in size (4). Selective angiography achieves visualization of the tumor in only a minority of patients. Preoperative ultrasound has proven of limited value because the density of these tumors is within the limits of the surrounding pancreatic tissue. Percutaneous transhepatic portal venous sampling has been suggested to be of some value in patients in whom a primary gastrinoma was not detected by conventional imaging methods. However, Cherner et al (5), in a study of 27 patients, found that gastrin sampling has equal sensitivity with imaging studies in localizing gastrinoma, but imaging studies have higher positive and negative predictive values and higher specificity. These authors suggest that selective venous sampling may be less useful in localizing gastrinomas than imaging studies and that the sampling should not be routine preoperatively. Experience with venous sampling has been limited, and a definitive statement about optimal management cannot be made at present.

In addition to confirming the diagnosis of Zollinger-Ellison syndrome and attempting to localize the tumor, one must also perform a general endocrine survey. One-third (6) of all patients with gastrinoma have multiple endocrine neoplasia (MEN) type I with adenomas of other endocrine glands, including the pituitary, parathyroid, and adrenal cortex. Serum calcium should be measured in order to assess hyperparathyroidism. Tests for pheochromocytoma, insulinoma, and somatostatinoma should also be performed.

In a 1985 screening program established by Bardram and Stage (7) designed to assess the frequency of endocrine disorders in patients with the Zollinger-Ellison syndrome, examinations were directed primarily against disorders of the pituitary, parathyroid, thyroid, adrenal cortex, and endocrine pancreas. Twenty-six patients were assessed, using x-ray tomography of the sella turcica as well as measurements of the circulating levels of ACTH, prolactin, TSH, FSH, LH, total calcium, ionized free calcium, PTH, T_3, T_4, glucose, insulin, creatinine, and free cortisol levels. Thirty-eight percent of the patients were found to have endocrine disorders, two-thirds being newly diagnosed. Bardram and Stage therefore concluded that most cases of endocrinopathies are not diagnosed unless specifically looked for.

The importance of diagnosing these endocrinopathies lies in the fact that MEN I patients tend to have multiple adenomas of varying size throughout the pancreas, which most investigators feel makes a surgical cure impossible. The only procedure that can be truly curative in these patients without evidence of distant metastases is a total pancreatectomy. This operation is, however, contraindicated because the benefits of operation do not appear to outweigh the operative mortality and long-term morbidity of insulin-dependent diabetes mellitus (6). Children and other first-degree relatives of patients with MEN I must be screened for endocrine tumors.

Treatment. As previously indicated, the effectiveness of H_2-receptor antagonists in controlling the gastric acid secretion and thus alleviating the symptoms in the majority of patients with Zollinger-Ellison syndrome has cast doubts on the original recommendation for routine total gastrectomy. According to the majority of investigators and surgeons (2), surgical treatment for the syndrome unaccompanied by an isolated gastrinoma is now limited to the use of histamine-receptor blockers in combination with a comparatively conservative surgical procedure, such as truncal vagotomy with pyloroplasty or highly selective vagotomy. However, controversy exists.

For example, in a 1985 study by Norton et al (8), five patients with extensive metastatic gastrinoma confined to the abdomen, in whom imaging studies suggested the possibility of complete surgical resection, underwent attempted excision in combination with chemotherapy with streptozotocin, doxorubicin, and 5-fluorouracil. Four patients had all tumor debulked at surgery and appeared to benefit, since all enjoyed a significant reduction in antisecretory medications. Three patients have had no detectable tumor on follow-up, and two of these patients are clinically and biochemically cured with normal fasting gastrin levels and negative provocative testing at 14 and 32 months postoperatively. Therefore, Norton recommends aggressive resection of metastatic disease in selected patients with malignant gastrinoma.

Some investigators (6) have cited the effectiveness of histamine receptor blockers and the newly developed drugs famotidine and omeprazole as indications that surgery should be avoided unless an isolated gastrinoma is discovered preoperatively.

The new histamine receptor antagonist famotidine is 20 times more potent than cimetidine and 7.5 times more potent than ranitidine. Preliminary results in a few patients with Zollinger-Ellison syndrome indicate that famotidine, alone or in combination with an anticholinergic, gives good control of gastric acid hyperacidity with no evidence of toxicity. It does not appear to have antiandrogenic effects or to alter hepatic metabolism of drugs such as cimetidine (9).

Omeprazole is a unique drug that decreases gastric acid secretion by inhibiting the action of the proton pump which exchanges luminal potassium for cellular hydrogen ions. This drug markedly inhibits basal and stimulated gastric acid secretion. In patients with Zollinger-Ellison syndrome, the profound and long-lasting antisecretory activity of omeprazole may make it the drug of choice for treating the massive acid hypersecretion associated with the disease, especially when H_2-receptor antagonists are ineffective (10).

However, as Norton reminds us, patients may feel more comfortable with increasing doses of medication, but without surgery, there is no chance of cure. He noted that in patients undergoing complete surgical excision the average survival was prolonged 3–9 years (8). Long-term medical treatment over a period of years, he reasons, may increase the incidence of functioning metastases.

In support of this position, Bornman et al (11) attempted to vindicate the policy of routine laparotomy in all cases of Zollinger-Ellison syndrome. They showed that five patients with extrapancreatic gastrinomas with lymph node metastases responded favorably to simple excision of all macroscopic tumor. Acid studies, serum gastrin, and secretin testing continued to be normal 8, 33, and 55 months after surgery in three of the five patients.

With modern therapeutic protocols, approximately 60% of patients with gastrinoma will be dead (40%) or dying (20%) 20 years after diagnosis. In the studies of Zollinger as discussed by Norton et al (8), patients with metastatic gastrinoma had a 5-year survival of only 42% and a 10-year survival of 30%. The patient with hepatic metastases has only a one in four chance of surviving 10 years. It is painfully obvious that this disease is not as benign as was once thought.

Conclusion

The surgical strategy in Zollinger-Ellison syndrome is evolving. The earlier reliance on routine gastrectomy in all cases was called into question with the development of histamine-receptor antagonists, and the role of the surgeon is now changing. Most investigators now call for a conservative surgical approach, although some advise aggressive surgical debulking in selected patients. Others are attempting to show the futility of routine laparotomy in patients without clearly definable isolated gastrinomas.

At present we are left with many questions. What is the definitive surgical procedure for Zollinger-Ellison syndrome? What is the proper role of preoperative image studies and selective venous sampling for gastrin? How can chemotherapy be used most effectively, and which agents are most successful in treating gastrinomas? What is the proper role for omeprazole and famotidine? Our decisions are now based on incomplete knowledge; future research and clinical experience are most certainly needed for optimal management of this disease.

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CONTENTS

MOUNT SINAI SCHOOL OF MEDICINE: 25 YEARS
Sherman Kupfer, editor

Foreword *Nathan G. Kase, Barry D. Stimmel, and Louis M. Aledort* 345

Introduction *Sherman Kupfer* 345

The Klemperer Legacy *Stanley M. Aronson* 347

The Goal *Hans Popper and David Koffler* 351

An Overview of the History of the Mount Sinai School of Medicine (CUNY) 1963–1988 *Barbara J. Niss and Nathan G. Kase* 356

Residency Training Programs Then and Now: Surgery *Arthur H. Aufses, Jr.* 367

Residency Training Programs Then and Now: Medicine *Alvin S. Teirstein* 370

The Educational Process at the Mount Sinai School of Medicine: The First 25 Years *Barry D. Stimmel* 375

The Graduate School of Biological Sciences: The First 25 Years An Interview with Terry Ann Krulwich *Terry Ann Krulwich and Sherman Kupfer* 383

Convocation *September 26, 1989*

Impact of Molecular Biology on Understanding of the Human Disease Process *Robert A. Weinberg* 392

Dean's Seminar 1 *October 26, 1988*

The Gift of Life: Dilemmas in Organ Transplantation *Moderator: Arthur L. Caplan Participants: George Annas, Robert Bazell, Lewis Burrows, Charles Miller, and Judith Swazey* 395

Dean's Seminar 2 *November 29, 1988*

The Quest for Quality Health Care: Whose Choice? Whose Responsibility? *Moderator: Avedis Donabedian Participants: John Eisenberg, Albert Gellhorn, Kathleen Lohr, and Robert Veatch* 406

Installation of Fifth President of the Mount Sinai Medical Center *December 6, 1988*

Inaugural Address *John Wallis Rowe* 423

On the cover: The Annenberg Building, constructed to house the School of Medicine, opened in Fall 1973. It is seen from Central Park looking northeast.

Illustrations

Medical Rounds in the classical Oslerian Blumenthal Amphitheater in the now demolished Metzger Pavillion. Reuben Ottenberg, Bernard Oppenheimer, Arthur Sohval, and colleagues. 346

Investiture of Solomon A. Berson as Murray M. Rosenberg Professor of Medicine in 1969. Gustave L. Levy, Donald Seldin, Solomon A. Berson, Murray M. Rosenberg, Milton Steinbach, and George James. 359

John Wallis Rowe, James F. Glenn, Thomas C. Chalmers, and Hans Popper. Painting of George James. 363

X ray conference in one of the two Blumenthal auditoriums, this one "the 300–400 seat gem," conducted by Bernard Wolf, who was chief of radiology from 1949 to 1977. 373

Surgical Rounds in the Charles A. Wimpheimer Ward. 391

Medical Rounds in Klingenstein Clinical Center in 1966. Jeremiah Gelles, Harold Mellin, Allen C. Unger, and colleagues. 394

After diligent research, the JOURNAL has identified some of the persons in the photographs published in this issue. We invite readers to send us any other identifications they can be sure of; we will forward these to the Archives of the Medical Center for its permanent historical record.

Index to Advertisers

Park Avenue Medical Center page 426

Foreword

Nathan G. Kase, MD
Barry D. Stimmel, MD
Louis M. Aledort, MD

Mount Sinai School of Medicine: 25 Years

The Mount Sinai School of Medicine of the City University of New York celebrated the 25th anniversary of the establishment of the school during the 1988/89 academic year.

In these two and a half decades, the school—which started with its first major basic science facility located in a thoroughly but rapidly renovated garage that previously housed New York City buses—has evolved into a major educational and research institution, an academic health center with one million square feet of new space on campus.

We have prepared over 1800 new physicians equipped to pursue the practice of medicine at the standards of excellence long identified with our parent institution, The Mount Sinai Hospital. In addition, we have expanded our capacity to conduct world-class research at the cutting edge of medicine and basic science.

To celebrate these achievements, and to afford the opportunity to express our special pride in the institution, a series of outstanding events were scheduled over this commemorative year. This special issue of the *Journal* marks the school's milestone quarter of a century by recording some of the proceedings of these events, along with other commemorative articles. The introduction below by the editor of this issue outlines its contents.

Introduction

Sherman Kupfer, MD

The Mount Sinai School of Medicine received its charter from the New York State Board of Regents in 1963. Much has happened during these first 25 years. The purpose of this issue of *The Mount Sinai Journal of Medicine* is to recall the achievements of these years, and to record the special events which took place during the anniversary year.

In looking back, it is clear that the school owes much to the traditions and reputation for outstanding patient care, innovative clinical research, and high quality professional education established by The Mount Sinai Hospital since its founding in 1852 as The Jews' Hospital. To honor this heritage, the *Journal* is proud to include some personal notes and reminiscences about one of the "giants" of The Mount Sinai Hospital, Dr. Paul Klemperer, who served as director of the Department of Pathology for many years prior to the birth of the school.

Some recollections by two senior faculty about their own residency training at Mount Sinai serve to highlight the contrasts with present training programs. Limitations in space have precluded solicitation of the experiences, both real and imagined, of many who trained at the hospital and who have served the hospital and the school with great devotion and skill.

The issue also includes the stimulating remarks of Dr. John W. Rowe, the fifth president and chief executive officer of The Mount Sinai Medical Center, on the occasion of his formal inauguration in this anniversary year. Dr. Rowe focuses attention on what must be achieved in the delivery of health care in general, and specifically on how the completion of the first phase of the new hospital construction, now called the New North Pavilion, will be key to the continued excellence in patient care.

The events leading to the founding of the school are chronicled. Again, limitations in space necessitated unintended omissions of many important contributions. The thoughts set down during those early years of the school by Dr. Hans Popper, a recent "giant," and his co-author Dr. David Koffler, published in this journal in 1967, are reprinted here to remind us of the hopes and aspirations which attended the birth of

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the school. In this respect, the curricula offered to the medical students and the graduate students then and now have been detailed by Drs. Stimmel and Krulwich. That Dr. Popper could not participate directly in the events of the anniversary year is deeply regretted, but an all-day scientific seminar in December 1988 was a tribute to his memory. Another important and superb academic event was Graduate School Day, celebrated in April 1989. Again, limitations in space have made impossible the publication of the scientific presentations on both of these occasions.

Even as the curricula evolve, the search continues for better ways to incorporate and transmit the fundamental information necessary for compassionate delivery of health care, as the proceedings of the two Dean's Seminars published in this issue clearly testify. These meetings were sponsored by The Mount Sinai Auxiliary Board as part of their well-targeted support for celebration of the 25th anniversary of the school.

Finally, this issue records the scientific presentations of our honored guest at the third convocation of the school in September 1988.

The staff of the *Journal* hopes that the readers will find this issue useful and perhaps constructively provocative in evaluating the performance and achievements of the school during its first 25 years. Others will have the task of evaluating how well the institution meets its proclaimed goals and aspirations for the 21st century.

Medical Rounds in the classical Oslerian Blumenthal Amphitheater in the now demolished Metzger Pavillion. On bench, right, Reuben Ottenberg; second from right, Bernard Oppenheimer, chairman of the Medical Board Committee on Medical Instruction from 1928 to 1939 and a consultant to it thereafter, and Physician to the Hospital until 1939; third from right, Arthur Sohval. *Photograph by Underhill from The Archives of the Mount Sinai Medical Center*

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The Legacy of Paul Klemperer

STANLEY M. ARONSON, M.D.

Talk delivered April 15, 1989 at Alumni Day, Mount Sinai School of Medicine.

My intention is to tell you something about a gentle and compassionate man named Paul Klemperer. He was pathologist-in-chief at The Mount Sinai Hospital for almost three decades, between the years 1927 and 1955. He published a modest number of papers, but no textbooks. He certainly contributed materially to our understanding of lupus and related collagen disorders as well as the pathogenesis of nephrosclerosis. Of the many illustrious physician-scientists in Mount Sinai's history, Klemperer exemplifies our most noble heritage. Perhaps as I share with you my very personal perception of his spirit, his beliefs, and his struggles, you may come to sense his enduring presence in the vitality which is Mount Sinai's.

His Life:
Freud and the Army

Klemperer was born 102 years ago in Grinzing, a suburb of Vienna. His father, Alois Klemperer, was an attorney by occupation and a scholar by inclination. The father was born in Brno, not far from the birthplaces of others from Bohemia who went on to achieve prominence in Vienna, men such as Sigmund Freud, Franz Kafka, and Gustav Mahler. In 1906, the younger Klemperer matriculated in the Faculty of Law, University of Vienna. He was an avid student, particularly in the classical languages and literature. Upon the casual advice of his father, young Klemperer enrolled in a university course called "Introduction to Psychoanalysis," taught by a 50-year-old physician-friend of the family, a Sigmund Freud. Klemperer was so profoundly influenced by the experience that he switched from the study of law to the study of medicine, with the intention of joining, ultimately, the emerging but somewhat contentious discipline of analytic psychiatry. Two years later, when he was caught in the acrimonious schism between Freud and Adler, Klemperer elected to redirect his youthful interests to family medicine.

Klemperer was awarded his medical degree in 1912 and embarked then upon a conventional course of graduate training in internal medicine, beginning with the customary year of apprenticeship in pathological anatomy. He chose the provinicial hospital in Brno, working under the great Carl Sternberg. The fascination for morbid anatomy led him to devote a second year with Sternberg. The timing of this decision was probably critical in terms of his subsequent career. He might then have returned to clinical medicine but the year was 1914 and the great war had begun.

The Austrian army demanded his services, assigning him duties as a laboratory physician. His unit provided service on the Italian front and then in Galicia on the Russian front. Klemperer observed and studied the infectious accompaniments common to all warfare—influenza, cholera, typhus, and of course the various dysenteries—performing immense numbers of field autopsies. At one time, late in the war, and after the onset of the Russian Revolution, Klemperer was briefly stationed in the laboratory of a military hospital in the Ukraine, sharing his professional responsibilities with a young Imperial Russian army doctor named Gregory Shwartzman. Ten years later, each having pursued circuitous career pathways (one through Turkey, Belgium, and England; the other through Austria, Chicago, and New York) they both were independently recruited by this hospital, one to head the Department of Pathology, the other to head the Department of Bacteri-

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ology. They began at the same time (1927), worked together occasionally on problems of mutual interest (such as the Shwartzman phenomenon), and retired at about the same time.

In 1919, after the war to end wars, Klemperer debated whether to start over in clinical medicine or to exploit his six accumulated years of extensive experience in pathologic anatomy. He chose the latter and returned to train further with Erdheim and Sternberg. The opportunities for professional advancement were limited in postwar Vienna, the capital now of an impoverished and territorially shrunken Austria. Klemperer elected to migrate to the United States, and for a few years he worked as an assistant professor of pathology at Loyola Medical School, Chicago, transferring in 1924 to New York Postgraduate Hospital. There he met two physicians, each of whom provided him with cherished personal and professional companionship for the remainder of his rich life: a young physician recently emigrated from Budapest, Dr. Margit Freund, who within two years became his lifelong wife; and Dr. Sadao Otani, a young pathologist previously trained in Japan and Germany, who became his lifelong partner in anatomic pathology at Mount Sinai Hospital. Dr. Margit Freund-Klemperer, incidentally, also worked in pathology for about thirty years, until the 1950s, when she resumed residency training in child psychiatry. It is fascinating that both Klemperers saw no ideologic incompatibility between pathology and psychiatry.

His Department: The Offices Had No Doors

In 1927, Mount Sinai Hospital, then a free-standing institution having only a marginal affiliation with Columbia University College of Physicians and Surgeons, embarked upon a bold course. It created departments of pathology, bacteriology, and chemistry, directed respectively by Paul Klemperer, Gregory Shwartzman, and Michael Heidelberg. The domains of these three eminent, full-time scientists were established in a modest, three-story, dark brick structure called the Lewisohn Building, then situated on the north side of E. 99th St.

Klemperer fashioned a highly functional department but one which was informally structured, without notable organization or privileged sanctuaries. No office doors were kept closed; indeed, most of the office niches had no doors. This department became the improbable intersection between two great medical traditions: the compulsion to explore through disciplined and rational inquiry; and, in a profession where aggressive activity is not totally unknown, the primacy of humane, solicitous behavior.

Actually, it was not a hierarchical department that he presided over; rather it was a loosely woven academy of mature persons who shared a common desire for explanation of the biological troubles of humankind. It was a wondrous, anxiety-free atmosphere, partly Hellenic and partly Talmudic in its relentless striving toward understanding and clarification of human disease. There was yet another ethnic influence, which I have already mentioned: Sadao Otani, Klemperer's partner for almost thirty years in the management of this creative center. One cannot think of one of these pathologists without also recalling the other. Otani emerged as one of the great surgical pathologists of the twentieth century. Where one, Otani, was laconic, methodical, and deliberate, the other, Klemperer, was articulate, speculative, and constantly ruminative. Their friendship was described by a former resident as "a deep mutual respect and love which lay beneath a peculiar mixture of bilateral diffidence, semiformality, humor and solicitude." Neither man encouraged or even tolerated followers. Klemperer believed: "I will work with mature physicians; I will have no disciples." But there were many, scores, who learned well from these men and then became outstanding pathologists throughout the United States. Of the many, let me mention but one, a physician from Detroit, Dr. Arthur Ginzler, who trained with Klemperer in the late 1930s. Ginzler, too, made notable contributions to our understanding of lupus; and now Ginzler's daughter, Ellen, is a brilliant professor of rheumatology at a sister medical school in this city, where she also specializes in the problems of lupus erythematosis. Klemperer had cast his bread upon the waters; and we shall find it after many days, but in this instance finding a continuum from teacher through father and daughter. Henry Adams once said that a teacher affects eternity.

The Morgue: First, Look with an Empty Head . . .

The department had three educational centers: firstly, the badly illuminated, rectangular conference room strewn with journals, protocols, and resident physicians; secondly, the Blumenthal auditorium, where Klemperer's remarkable weekly clinical pathology conferences were conducted, attracting hundreds of physicians. There were many practicing physicians in New York City who held no office hours when a Klemperer conference was scheduled.

And of course the third educational center was the morgue, a place neither intimidatingly aseptic nor inaccessibly remote. Indeed, one of the special features of the Mount Sinai morgue was its openness, its tacit invitation to the community of learning physicians that truly and surely in this place the dead shall teach the living. This was undoubtedly so, but the dead needed frequent help from Klemperer. He was there, with neither reluctance nor sufferance. He regarded the morgue as his inner, personal laboratory, as the best possible place to cast light upon the dark places of human impairment and to seek meaning in the tragedy of a single person's death. It took a Klemperer, partly in whimsy but mainly in humility, to comment to a young physician on the unlikely bond between a morally committed autopsy service and the Gettysburg Address. "It is for us the living to be here dedicated to the unfinished work before us. . . . that we here highly resolve that these dead shall not have died in vain."

An autopsy, as many of you know, is neither a gracious nor an esthetic event: at worst, it is a time-consuming desecration of the human body; at its best, when Klemperer was there, it was a consummate, yet humbling, teaching experience, a wondrous exercise in rational inquiry; it became the embodiment of Boerhaave's observation 260 years ago, that one knows little of disease phenomena until one has opened the body. The Mount Sinai autopsy room was an arena for constant dialog between Klemperer and the clinical residents, between Klemperer and the attendings, between Klemperer and the pathology fellows, and most expressively eloquent of all, between Klemperer and Klemperer. These latter colloquies were candid, intense, anecdotal, and reflective. Ideas ebbed and flowed like the tides, some discarded and some salvaged for future scrutiny. Klemperer, who loved the poetry of Goethe, construed the autopsy to be a Faustian contract: I shall let you look within me but only if you understand *and accept* the solemnity and responsibility of this awesome privilege; only if you will invest all of your efforts in resolving the enigmas of my clinical course.

The Klemperer dialectic at the autopsy table —a kind of bedside teaching—was essentially socratic in structure: questions, observations, projections, and more questions. Klemperer said to the organs, "What are you trying to tell us?" This expression is so similar to the words of Osler, "Man must interrogate as well as observe nature."

There were en passant remarks by Klemperer which cumulatively strengthened our framework of inductive reasoning, such as the repeated instruction: "First, look with an empty head—then speculate." The growth of pathology in this past century has been achieved through a succession of observations on the natural trajectory of human disease, our understanding augmented further by parallel experiment. Theories were distilled from observation, and as incorrectly interpreted observations were corrected in time, so too did theory come to be modified. But theory lingered after observation. "First look with an empty head—then speculate." The gathering of data was to be an innocent task, free of coercion, guile, or foregone conclusion. In the words of Morgagni, "He who searches for truth must carefully report everything he notices even if the cause vexes him." "First, look with an empty head. . . ."

. . . Then Speculate

And after the unprejudiced harvesting of observation, the "looking with an empty head," what then? Beyond that point, innocence was no longer a blessing but an impediment. The need now was for critical skepticism, learned skepticism, skepticism grounded in the written and oral observations and speculations of others. Ignorance was an unacceptable basis for criticism. To be allowed to doubt even a discredited theory, in Klemperer's presence, required that one first possess a sound understanding of that theory. A story is told of Shlomo, the great atheist, who lived and prospered, at the beginning of this century, in the Jewish quarter of Vilna. His coreligionists from near and far would come to his shop under the sign, "Shlomo the Atheist," seeking his advice on weighty matters both secular and religious. Yanko, a young man from a neighboring Jewish ghetto, impressed with Shlomo's obvious success, opened a similar shop with the sign "Yanko the Atheist." Months passed, but nobody sought his advice. In desperation, Yanko went to Shlomo for help. "I have done everything that you have done and I have a sign in front of my shop, as do you, but nobody asks for my advice." Shlomo pondered for a moment and then asked Yanko, "My friend, have you studied the works of Rabbi Hillel?" "No," said Yanko. "The works of Maimonides?" "No," said Yanko. "The riches of the Talmud?" "No," said Yanko. "My friend," said Shlomo, "you are not an atheist, you are an ignoramus!"

The contradictions, the inconsistencies were diligently sought after in Klemperer's department, and when a subject ceased being controversial, it ceased being of active interest. And often when intriguing relationships emerged at the autopsy table, Klemperer turned to a member of the house staff and recommended that he pursue this inquiry further with the possibility, ultimately, of publication—*eine kleine Arbeit.* These recommendations were a little stronger than an urging but a little more gentle than a command. Almost never did Klemperer's name appear as coauthor, despite his stream of contributions and his editing of the many manuscripts. He did not offer his name lightly.

More than anything else about him, I remember Klemperer's reflections and the willful courage he displayed in thinking aloud. I know now the occasional conjectural errors he made; yet a great man's errors are to be venerated more than a little man's truths. His elaborate disquisitions were rooted in his vast clinical experience and readings; and he exploited this in order to speculate freely upon the seats and causes of human disease. For most of us less gifted, our professional experiences are like the taillights of our cars: they illuminate only where we have already been. This part of the Klemperer legacy, the courage to free associate, must surely relate to his earlier associations with Sigmund Freud.

Klemperer was a large man—in spirit, in feelings, and in body volume: a benevolent, generous man, a secular St. Nicholas. His face was a varying study in bemusement, rapt attention, and enthusiasm for the impending challenge of a clinical mystery. He listened to each visiting clinician, closed his eyes at the key points in the presentation, leaned back in his chair, massaged his balding head, murmured an occasional line from Goethe or Heine, and periodically opened his eyes to stare at the large print of Sigmund Freud suspended over his desk—as if to share a passing moment of exasperation, confusion, satisfaction, or insight with his former Viennese mentor. There were many, incidentally, who regarded Klemperer as Mount Sinai's most discerning clinician.

Upon retirement from the directorship of the department, Klemperer reverted gracefully to the role of the student. He studied part-time in a cell-biology laboratory which was situated on 101st Street. Klemperer, in retirement, also worked in the New York Academy of Medicine library aiding in the awesome English translation and editing of that seminal landmark in modern pathology, the 1769-five-volume text by John Baptist Morgagni, *De sedibus et causis morborem per anatomen indagatis*. Thus, to the end of his life with us he labored to clarify both the contributions of the past and the promises of future inquiry.

A Teacher Affects Eternity

Klemperer encouraged us to regard teaching as an essential part of our professional lives, that to teach is to learn twice. He said that to *speak* to a medical assemblage is no great event—but to be *listened to* by such a group, there lies the great honor.

A story is told of the Chinese emperor who commanded his ministers to seek out the wisest person in all his kingdom. The search went on for interminable months until finally the ministers were satisfied that their choice had indeed fulfilled the emperor's mandate. On a specially chosen morning, the selected wise man was presented to the imperial court. The wise man sat upon a special rug before the throne. The emperor, about to question the wise man, noticed yet another man sitting quietly behind the wise man. And the emperor asked, "Who is this with you, wise man?" And the wise man answered, "This is my teacher."

From the 1920s to the 1960s, during the four exciting decades preceding the birth of this great medical school, Mount Sinai Hospital was blessed with an abundance of brilliant, inventive, and creative leaders in clinical medicine. And from the incubator of Mount Sinai's residency and fellowship programs came so many of the future leaders of other services, and other departments, in the many hospitals and medical schools of this nation. Were those outstanding physicians to seek out that special station in their Mount Sinai experience where they were selectively nurtured, encouraged to think courageously, forced to address ambiguities, prodded to distinguish between nonsense and reality, where their orientation to a rational pathophysiology was devised and their instruments for inductive, scientific inquiry honed, most would reflect and then say, "It was in listening to Klemperer, for he was our teacher."

We who were privileged to know him recall him as one who was shy yet effective, retiring yet generous, undemonstrative yet passionate, learned yet learning, always learning. For he was truly our teacher.

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The Goal

HANS POPPER, M.D., AND DAVID KOFFLER, M.D.

Reprinted from this journal, then still titled Journal of The Mount Sinai Hospital, *as the epilogue to the second of two issues titled "Trends in New Medical Schools" under the editorship of Hans Popper (vol. 34, no. 4, July–August 1967, 401–407).* *The journal was renamed* The Mount Sinai Journal of Medicine *with vol. 36, in 1970, to encompass the new medical school.*

The major goal of new and old medical schools is to produce physicians whose training is consonant with the future needs of society. Medical educators have, therefore, to anticipate areas of significant social change and predict the effects of these changes on the structure and practice of medicine. This responsibility weighs particularly on new medical schools because of the greater opportunity for experimentation. This responsibility is even heavier if the new school is in a large metropolitan center in the United States because here the society of the future seems to be better exemplified than anywhere else. By 1980 the population will be concentrated predominantly in cities, resulting in a further vast increase in technological resources in these centers. Thus, such a new school can rely even less on previous experience, but should serve as laboratory where the advances in medical care are to be tested.

The medical school may address itself primarily to the immediate relief of the medical manpower shortage or to medical needs 20 years hence when the first graduates of the school will approach the peak of their professional career. The immediate need of the community is for the general practitioner, family physician, or primary physician (1) who is rapidly disappearing from the medical scene. It is probable, whether desirable or not, that this general practitioner will have largely vanished in the next 20 years, at least from the large urban centers. Medical educators have the responsibility for producing physicians and allied health personnel trained in order to meet the expanding and justified medical needs of the population. In academic institutions, moreover, they must develop such systems of medical care by trial and error experimentation.

The Prediction

The group responsible for the design of the philosophy of the Mount Sinai School of Medicine has, therefore, considered prediction of the future as the most important factor in shaping the curriculum, and in outlining research problems in the area of community medicine. The key points, stated several years ago (2), are even more applicable today:

1. The exponential increase in the amount of medical information makes it impossible for an individual to retain all essential facts.
2. The increased use of quantitation in biology and medicine changes methods of medical practice.
3. The development of a unity of biology blurs the borders among biological disciplines and permits the application of similar principles to various branches of biology.
4. A clinical science is emerging and applies at the bedside the exact techniques and heuristic principles used in basic science.
5. Technologic sophistication in medicine is rapidly developing.
6. Specialization narrows the field and enhances the application of knowledge from pertinent basic science; moreover, observations derived from research in the limited field assist in service activities and vice versa.

When this article was published, Hans Popper was Dean for Academic Affairs and Professor and Chaiman, Department of Pathology; David Koffler was Assistant Dean for Academic Affairs and Associate Professor of Pathology, Mount Sinai School of Medicine, New York, NY.

7. The importance of behavioral and environmental factors is recognized in the prevention, diagnosis, and management of disease.
8. More potent pharmacologic and manipulative techniques are utilized and entail dangerous side reactions, which may create serious ethical problems during the initial testing stages.
9. The age distribution shifts to an older population, which may be partially incapacitated.
10. Tools for recognizing disease in a preventable pre-symptomatic stage are being introduced. (This is another reason for the transformation of the hospital from a temporary shelter for acute disease into a health center for continuous care.)

Three additional trends representing facets of the same problems deserve emphasis at this time:

First, when the interest of society in medicine and health care rises together with the expectation of the best possible medical care, the administration of health care becomes more sophisticated, and the overall responsibility tends to shift from the physician to the social scientist. The latter, rather than the practitioner of medicine, may thus dominate the apex of the health care pyramid. Several forces favor this development which deserve recording, although not necessarily approval. The social and governmental sciences are acquiring more and more scientific veneer and nomenclature, but they are still far from precise documentation of theory by experiments. The approach which characterizes the basic scientist and hopefully the clinical scientist does not yet exist for the social scientist. Nevertheless, he is acquiring equal status with the basic and clinical scientist in the design of health care. This is enhanced by the reluctance of a large segment of the medical profession to compete with the social scientist in governmental decisions concerning medical problems. The governmental approach de-emphasizes basic science and stresses the more immediate application of medical discoveries. Moreover, the policy-making administrator, being a social scientist rather than a physician whatever his academic degree, will be more concerned with the interests of society as a whole than with those of the individual patient. The importance of a disease as reflected in the time it occupies in a curriculum and the amount of funds devoted to its study becomes related to its incidence and impact on society. In contrast, the individual is the primary concern of the physician, while, for the clinical scientist, the understanding of rare "exotic" disease is a challenging experiment of nature which permits a basic understanding of disease processes. The conflicts, however, among social scientist, physician, and clinical scientist are beneficial from the point of view of reaching a concensus useful in teaching and patient care.

Second, the emergence of the concept of the regional center or complex dedicated to a single disease group may alter not only the relations between patient and physician, but also among physicians themselves, and, therefore, significantly change the structure of medical education and practice. The concept implies concentration of equipment and specialized knowledge for the management of major diseases, such as heart disease, cancer or stroke, in one major medical installation, usually university controlled. This center is to serve a large geographical area with affiliated hospitals referring patients to the center. The economic implications of this system are of limited interest here. More important for the physician in training is the fact that the physician in charge of the center will control the most important tools for the management of disease. This might eliminate the present conflict between the preeminent clinician who, as private practitioner, is the acknowledged leader in conduct of medical care and the full-time chairman of a department or unit. The latter is usually a clinical scientist with his primary interest in investigation and is frequently only tangentially concerned with patient care. At present, the young physician is torn between these two idols which he wishes to emulate. In the regional center, however, these divisions will probably merge. The instititutional chief being custodian of complex equipment and specialized medical knowledge will not permit himself the luxury of a primary research career, but will be encouraged to consider the administration of medical care as his major function. The private practitioner may thus play a lesser role, because the best facilities in patient care exist in the center. Hopefully the idol for the budding physician will be a new breed of medical leaders, a specialist who combines clinical excellence in a circumscribed field, an understanding of basic quantitative problems of this field, and conducts research in it. Postgraduate and predoctoral training programs may also utilize the center as sources of education in both basic science and clinical medicine.

While the leading medical schools in the country do, at present, emphasize as a measure of their excellence the number of professors in full-time medicine which they have developed, they may in the future also refer to the men in top positions in the centers as their most important products.

Third, the development of computer techniques may alter the practice of medicine on different levels. They serve primarily as a labor-saving device when used for data retrieval, although these techniques may also allow the synthesis of new information. The simplification of record keeping and the ease of reproduction will make available to the physician information which sometimes is obtained only with considerable difficulty and with great time loss. The culmination of this principle is the national storage of the medical history of every citizen, including such readily stored facts as immunization records, hospitalization records, laboratory findings, operative results, etc. The existence of such a national depot readily accessible to every practicing physician is technically possible today. Problems of ethics enter, however, since certain information of damaging nature such as criminal records or temporary mental disease could not be eliminated from the data.

Another area of computer application in medicine is the conduct of experiments by analogue computer which might allow a radical reduction of the number of experiments, frequently from an excessive to a manageable level. This is more a problem of research than teaching.

The utilization of cybernetic techniques in the diagnosis of disease is most critical for teaching. The development of computer techniques may be ready for this approach, although this area of medicine is not easily programmed. Computer analysis of laboratory data such as biochemical and even electrocardiographic findings should entail no difficulty and such applications are rapidly being developed. Two major obstacles, however, arise in the utilization of clinical and even pathological observations in diagnosis. One difficulty is that these observations cannot, at this time, be quantitated or even clearly be defined by words. Moreover, diagnoses, based on clinical observation, are derived only in part from conscious application of definite criteria which may or may not be quantitated. Frequently, however, the diagnoses are based on intuitive subconscious association of observations. The physician can hardly define or teach these associations. They are translated with difficulty into exact information and they surely cannot be stored in the computer. This brings us to the theory of learning and a psychological investigation of the physician in the process of diagnosis or decision-making. Herein lies the separation of medical art, based on intuition, from medical science. Decades of study will be required to verbalize and quantitate many of our observations and to raise diagnostic association from subconscious to conscious levels. Success in these endeavors will modify the conduct of medical teaching more than any peceding development resulting from progress in biology.

The Challenge

The shortage of medical manpower on all levels—specialists, generalists, nurses, technologists and biomedical engineers—deserves no further comment and has priority in government and social thinking, even at a time when the nation's resources are stretched to the limit by defense needs. The solution lies in the organization of a system of health care which preserves dignity and provides enthusiasm for health workers, and attracts young men and women to the field, with avoidance of frustration resulting from work which is either uninteresting or for which the worker is not prepared.

The physician of the future, as the primary product of the medical school, will have to develop attributes which were previously not taught in medical school, although many schools are now experimenting with curricula meeting these needs.

The Mount Sinai concept (3) embodies these considerations by the definition of a new tripod requiring balance. It supplements the old accepted tripod of patient care, teaching, and research by defining the teaching leg by the following three aspects:

1. Emphasis on quantitative biology in medicine, so that the physician becomes a superb technician "equally equipped for treatment and for prevention of disease," but with an unavoidable tendency for specialization.
2. Concern for the patient as a whole with his mental and physical problems as well as those of his family, acquired by "continuous education and better exposure to teaching in sociology, psychology, social anthropology, economics, ethics, and philosophy of science." The knowledge acquired from psychology and sociology may shelter the student from the extremes of cynical disregard of or over-identification with the physical and mental pains of the patient.
3. Interest in society as a whole and in a patient care system in which all justified medical needs of every member of the society are considered. This is now frequently summarized under the term "community medicine" dealing

with prevention of disease and logistics of patient distribution.

In all three aspects of this tripod, the medical student will have to be trained to work together with allied health professionals. He will depend on the basic scientist, ancillary technicians, and the biomedical engineer for problems in quantitative biology, and in the area of patient concern on the behavioral scientist and the sociologist. The latter is even more important in "community medicine" where the student will be particularly concerned with the allied health professionals conducting some of the medical care now assigned to physicians.

The necessity for training the M.D. candidate to work together with the members of the health professional team is a major reason for educating all members in the same school, which broadens the medical school to a school of higher learning in the health sciences. Its curriculum will depend on the composition of the health team of the future. The role of the technical or medical basic scientists such as biochemist, biophysicist and their technicians, of the behavioral scientists, and even of the economists and sociologists concerned with health science problems is clear. Less well established or even accepted is the role of clinical assistants concerned with supervised patient care for partial replacement of the physicians' services.

The nursing profession has accepted the responsibility for much of the institutional care which in previous years was, and in Europe still is, the sole function of the physician. In some countries, particularly in the eastern part of the world, poorly trained physicians are being produced, whose limited training prevents them from becoming specialists and makes them satisfied with primary medical care. In fact, this "feldscher" is an independent practitioner whose responsibility to refer a case to better trained physicians or medical installations rests with him alone. In this country, such limited training is objected to on practical and philosophical grounds. Moreover, advancements in techniques should make it possible to develop a health team in which clinical technologists or assistants with college or even graduate degrees might serve as the initial contact with the patient in institutional and home care. They may use screening tests in the patient's home and thus avoid excessive hospitalization and visits to the outpatient department. The system of a free enterprise society, also, demands upward mobility for the members of the team on the basis of additional training and on demonstrated efficiency in practice. The education of these clinical "technologists" in an institution of which the medical school is one part entails at least three advantages:

[1] It permits the training of medical students in cooperation with the clinical "technologist" as he would be expected to perform in his future practice.
[2] It makes the upward mobility, just referred to, possible, so that the clinical technologist might advance to become an M.D.
[3] (and probably most important) The development of such teams, by trial and error, is becoming one of the most important functions of a medical school, as part of a health science oriented school of higher learning or university. To leave the experimentation with these systems in the hands of social scientists results in an unfavorable reception by the medical profession and an undesirable reaction by the patient. If medicine is to respond to its challenge, it not only will have to develop quantitative biology and a cybernetic approach to diagnosis, but, of equal importance, it will have to demonstrate the usefulness of health care teams in the confines of the university hospital.

The medical schools will have to find a replacement for the revered general practitioner. At present, it might appear challenging to construct a system consisting of four categories:

1. The clinical technologist who would have the first contact with the potential patient, comparable to the role of the corps man in the armed services.
2. The specialist steeped in basic and clinical sciences, to handle more complex medical problems.
3. The psychiatric social worker to take care of the large number of emotional problems deserving attention.
4. The medical specialist in patient distribution and logistics who conducts his research, service and teaching, probably in this order, to oversee the system.

Computer techniques after they have been worked out will assist in clinical management, particularly in categories one and four.

The Solution

The challenge will be met differently by different institutions, depending on local circumstances and preferences. Agreement will probably evolve as to the construction of a health science school of higher learning, comparable in some respects to the technological science integration at the Massachusetts Institute of Technology and the California Institute of Technology.

These health science schools may be part of "multiversities" concerned with all aspects of higher education or may be independent institutions capable of broadening into universities similar to the institutes mentioned above. The graduate school of Biological Sciences can easily be integrated with the medical school, as this will facilitate the interchange of students between the two schools without loss of credit or prestige. For example, the medical student may continue in biochemistry or in another life science. The coordination of graduate schools devoted to sociology, psychology or other aspects of social sciences and humanities relevant to health may be a greater problem. The greatest existing difficulty is the integration of schools of clinical and laboratory technologists although hopefully these barriers will fall since dental and public health schools are now being integrated with medical schools without difficulty.

The problems of curriculum in the medical school will be primarily determined by the interest of the staff and the type of students, and no brief can be made here that our own solution (4) is better than any other, although universal agreement probably exists with three principles: namely,

1. The unity of biology, including basic medical sciences and clinical sciences.

2. The need for some element of integration:
  - *a.* of the teaching space, as exemplified by the multidisciplinary laboratories;
  - *b.* of the teachers by unifying various departments and courses;
  - *c.* of basic science with clinical medicine and both with social sciences and humanities;

3. The attempt to imbue the medical student with the spirit of a graduate student rather than of a trade school student by giving him adequate time (elective periods) to study chosen fields in depth. We cannot forget however that any licensed physician becomes a threat to society if he does not command a core of information comparable to that given in a trade school. The identification of this core so far is not completed.

Whatever the specific system is, however, the product will probably reflect the enthusiasm of the teacher and the initial quality of the student body rather than any specific teaching technique.

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An Overview of the History of the Mount Sinai School of Medicine of the City University of New York, 1963–1988

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Over the past year Mount Sinai has celebrated the twenty-fifth anniversary of the chartering of the School of Medicine. It has been twenty years since the first students entered—not a very long time in the history of Mount Sinai, but an important era, bearing witness to Mount Sinai's determination to be a leader in American medicine.

Medicine has changed incredibly since Mount Sinai Hospital was begun in 1852, and in each instance, Mount Sinai has changed in response (1). Organized as a philanthropic enterprise to provide health care to the Jewish poor in New York, the hospital from the beginning retained the leading lights of New York medicine on its staff. At a time when American medical schools were still struggling to formulate and meet minimum standards for training doctors, Mount Sinai attracted physicians who had gone to the great academic centers abroad for undergraduate or graduate medical training, learning the latest techniques and bringing them back to New York.

As the site for clinical teaching and research when the basic biologic concepts underlying health and disease were largely unknown, hospitals were an important part of the medical education system. Hospitals, because of their mass of patients, were able to provide eager undergraduate students and house staff many and difficult cases to study. Forward-looking hospitals such as Mount Sinai also used the newest methods and equipment to aid the practitioner and students.

With the Flexner Report of 1910, university medical schools became the acknowledged leaders of medical research and education, while hospitals' educational roles remained static, becoming clinical teaching adjuncts to the universities. The tremendous growth in federal research funding after World War II accelerated this trend, as increasingly money was funneled to university-based biomedical programs. Thus, medicine and medical education changed dramatically in the twentieth century as the basic sciences forged ahead with new and increasingly sophisticated techniques to explore the pathogenesis of diseases. Universities gained steadily in importance as laboratories for basic research and as training grounds on which young medical students learn the new scientific underpinnings and research methods of medicine.

Because of its unusually strong clinical laboratories and commitment to research, Mount Sinai long held its own against this shift in American medicine. During the 1950s, Mount Sinai ranked 27th among all institutions in the country in terms of research grant dollars from the National Institutes of Health—despite the presence of eighty medical schools on that list. Sinai's residency programs continued to attract highly desirable candidates.

But some members of Mount Sinai's medical staff in the 1950s were concerned that this would not always be the case. It was feared that young doctors might continue to take their internships at Mount Sinai, but would not spend their careers

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From the Dean's Office (NK) and the Archives Division of the Levy Library (BJN), Mount Sinai School of Medicine of The City University of New York. Address reprint requests to Barbara J. Niss, Box 1013, Mount Sinai Medical Center, 1 Gustave L. Levy Place, New York, NY 10029-6574.

here, preferring instead the full-time academic appointments and atmosphere that university medical centers offered. It was also noted that private practitioners no longer had the time, or always the scientific training, to perform modern biomedical research. To preserve a reputation for research innovation, a larger full-time staff and basic scientist component would have to be added.

Planning the School
A University of the Health Sciences

The formative years of the Mount Sinai School of Medicine have been detailed in many places (2–7). A brief overview must suffice here.

The first official proposal to establish a medical school at Mount Sinai was made to the hospital trustees in January 1958. There had been earlier, informal discussions of the topic (8), but at the time, the need for a school was less clear and the desire of the medical staff less focused. In 1958, the trustees decided to pursue the matter further to determine the viability of the concept and the possible cost.

To this end, Dr. Hans Popper, director of Pathology, and Dr. Alexander Gutman, director of Medicine, went to Chicago to sound out the leaders of the American Association of Medical Colleges on their feelings about the hospital founding a school. Although the group acknowledged Mount Sinai's reputation as a clinical leader, they hesitated over the idea of a hospital creating a school without the participation of a university. As Dr. Popper said in an interview in 1966:

> We were told point blank that while they would consider Mount Sinai an excellent breeding place for a medical school, they would be afraid that violation of the basic principle in American medical education, recognition that a hospital could make a medical school, would throw back American medical education so much that they would rather sacrifice an excellent school than sacrifice the principle (9).

The need for a university affiliation and the skeptical attitude of medical leaders were only two of the barriers to the creation of a school. Not everyone at Mount Sinai was convinced of the wisdom of adding a school. Some were concerned that needed resources would be drained from patient care and postgraduate teaching to fund the school. Some feared the school might not live up to the reputation of excellence established by the hospital. And there was the real obstacle of raising the needed funds to provide the physical facilities, staff, endowment, and equipment needed to open and operate a medical school.

With these problems and reservations before them, a group of physicians and trustees went ahead to define the needs of the school, plan a philosophy and then a program, and build the support necessary to establish the school. Several names stand out in this connection. On the medical side: Hans Popper, Horace Hodes, Alexander Gutman, Paul Klemperer, and George Baehr, among others. The trustees involved included Gustave L. Levy, chairman of the Board of Trustees; Milton Steinbach, the first president of the Mount Sinai School of Medicine; Alfred Stern, chairman of the Development Committee; and many others who worked to raise funds and plan for the future of the institution.

In November 1961, outside consultants—Drs. William B. Castle and W. Barry Wood—visited Mount Sinai to review the research program of the hospital at the behest of the Research Administrative Committee. They praised the current efforts, but warned that "the Mount Sinai staff may have great difficulty in maintaining its present standards of excellence without a much closer relationship to a university medical school." Based on the trustees' and staff's obvious desire to pursue a school, they also urged the appointment of a larger advisory committee to help plan its creation (10).

This new advisory board of distinguished outside medical leaders was set up a short time later to give advice on direction, planning, university affiliation, and the selection of a dean and faculty. Correspondence went back and forth to the American Medical Association, the American Association of Medical Colleges, and their Liaison Committee on Medical Education. All involved offered encouragement for Sinai's efforts, but the caveat remained—a university influence was imperative.

While dealing with these outside forces, Mount Sinai was defining an ideal of what a new medical school could be. Hans Popper articulated the early feelings of the planners in what later became known as the "Mount Sinai concept" (11). This was the "balancing [of] biologic thinking in medicine with a concern for the whole patient" (p. 502), encompassing three objectives for medical education, which he elaborated in his article "New Objectives in Medical Education" (12):

> introduction of quantitative biology into medicine with inherent area-specialization; . . .
> counteraction of the depersonalization of the organ-specialized physician by the broadening influence of social sciences and human studies; . . .
> community medicine which, by experimentation, strives in a setting of specialists to give good care to every person and every disease beginning in the presymptomatic stage.

The belief grew that the best way to achieve this new kind of medical teaching was to create at Mount Sinai a new kind of medical institution, a university of the health sciences. This institute would provide "a medical school supported by a strong teaching hospital, a graduate school of biologic sciences, a graduate school of physical sciences, a graduate school of human studies representing a concentration of those departments of social sciences and human scholarship as they are relevant to health care" (p. 478). Mount Sinai wanted to create this type of environment on the Mount Sinai campus, with or without a university affiliation.

Events moved quickly. A provisional charter was received in June 1963. A separate board of trustees for the school was created. Gustave Levy announced the planning of the school to the news media and promised that the first students would enter in 1968. Site visits were made to other institutions, and outside agencies visited Mount Sinai.

In 1964 the first six departments of the school were established: Medicine, Surgery, Obstetrics and Gynecology, Pathology, Pediatrics, and Psychiatry, the program directors becoming acting chairmen and professors—the first faculty of the school. In February 1966, 500 more faculty were appointed; when the school opened in fall 1968, the faculty numbered 1,500.

Physical Facilities. An important element in planning for the school was the development of the physical facilities to support the new functions, an incredibly expensive undertaking. It was envisioned that a medical school tower building would be erected. Several versions were suggested, based on a detailed plan documenting the total facility needs of Mount Sinai. In 1964 a grant proposal was submitted to the federal government to help cover construction and renovation costs. Although the proposal was rated very highly, no funding was forthcoming.

A good start in raising the needed private funds was made in 1965 when the eight children of Mrs. Moses Annenberg gave $1 million each in her honor toward the construction of the tower. Still, the federal money was imperative. The grant proposal was revised and resubmitted in February 1966.

Committed to their promise to open the school in the fall of 1968, in mid-1966 the trustees purchased an old bus garage on 102nd Street. This was renovated in record time to become the Basic Sciences Building, large enough to hold the first- and second-year classes until the tower building could be built.

Word got back to Mount Sinai that the new grant proposal was well received, but the funding was being held up because the U.S. Public Health Service was uncomfortable with Sinai's continuing lack of a university affiliation. Although discussions on possible affiliation had been held with Princeton, Albert Einstein, Brandeis, New York University, City College, and New York Medical College, none of these universities were willing or able to meet the conditions Mount Sinai sought: a campus based at 100th Street, fiscal control residing in Mount Sinai, a program that would provide an academic environment, training all levels of biomedical workers, from technicians to PhD scientists, with continuing education for practicing physicians. However, on July 31, 1967 an agreement was concluded between Mount Sinai and The City University of New York. In September 1967, an award of $26 million, the largest such grant up to that time, was announced by the federal government.

Selecting the Dean. Another important facet of founding the school was the selection of a dean. The charter documents list Hans Popper as dean, and he served as the acting dean from 1962. A long search process for a full-time dean was begun in 1963. In this time many people were considered, and some ultimately came to Mount Sinai as faculty or advisors.

Dr. Irving Schwartz, a well-respected physiologist, was the first to be tapped as a dean. He arrived early in 1965 and gave advice on planning and direction, primarily in the organization of the Graduate School for Biological Sciences. In June 1965, Dr. George James, commissioner of health in New York City, was announced as the first dean of the Mount Sinai School of Medicine.

Dr. James was a fortuitous choice. He had years of administrative experience as a public health official, with an intimate grasp of the workings of the government and politicians at all levels—an invaluable skill when negotiating the rapidly changing regulatory and fiscal environment of the 1960s and 1970s. He was also a recognized leader in community medicine, one of the legs of the tripod of medical education constituting the Mount Sinai concept. His appointment to the deanship coincided with his selection as the first chairman of the new Department of Community Medicine—a clear sign that this was to be not only the largest such department in the country, but also a very active center.

The school over which Dean James was to preside had three major components: the undergraduate medical school, the Graduate School for Biological Sciences, and the Post-Graduate

Investiture of Solomon A. Berson as Murray M. Rosenberg Professor of Medicine in 1969. From the left: Gustave L. Levy, chairman of the Boards of Trustees; Donald Seldin, then Chair of Medicine at Southwestern Medical School, who spoke at the investiture; Solomon A. Berson; the donor Murray M. Rosenberg; Milton Steinbach, first president of the Mount Sinai School of Medicine; and George James, first dean of the School of Medicine and president of the Medical Center. *Photograph from The Archives of the Mount Sinai Medical Center.*

School of Medicine. These units encompassed the training of MD students, house staff, practicing MDs, PhDs, and MD-PhDs. In October 1967, the Post-Graduate School offered the first course of the Mount Sinai School of Medicine.

The Early Years, 1963–1973

The deanships of George James and Hans Popper were primarily structural years concerned with concrete issues: buildings; fundraising; university affiliation; receiving accreditation; establishing new departments; hiring faculty; developing governance rules, procedures, and committee structure; setting up mechanisms for accepting and promoting students; creating curriculum; designing and printing catalogs. Everything was a first. Formalities were not yet established, and there was hope for a successful blending of innovation with traditional medical school practices.

The process of rebuilding Mount Sinai to accommodate the school was central during these years. Six buildings were razed to make way for the Annenberg Building (13). Construction was delayed and the building did not open in 1971 as planned, but in the fall of 1973. Departments had to make do with old or temporary quarters. Faculty recruitment was made more difficult by the lack of laboratory facilities.

For all the problems and setbacks, progress was rapid. As the trustees had promised, the school opened in September 1968, a short five years after chartering, with a first-year class of 36 students, 4 of whom were women. There was also a third-year class, unusual in a new medical school but allowed by the authorities as a clear affirmation of the clinical faculty's many years of teaching experience. This group became the first graduating class on May 27, 1970.

Another vital aspect of Dr. James' tenure was raising the funds to provide the physical facilities, endowments, salaries, equipment, and supplies necessary for modern research. The original "guestimate" was that $5 million would be needed. When a formal fundraising campaign was mounted in 1965, the goal was $56 million. This was quickly enlarged to $102 million, and finally settled at $152 million. That figure was reached in 1976.

As Dr. James' term progressed, the rosy financial picture of government support began to change. The interest derived from the Annenberg Building fund helped postpone some of the impact of reduced federal funding. In 1971 that source of funds was gone, and the medical center posted a deficit. Cutbacks were made on programs; many hoped-for projects were not pursued, and many pieces of equipment were not purchased.

Another imperative issue was the need to change Mount Sinai's perception of itself from that of a hospital to that of an academic health center with a medical school at its core. This matter of self-perception was paramount, affecting the relationships of all groups to each other and to the medical center: trustees, administration, the growing full-time and the voluntary faculty.

The concept of a unified medical center was slow in developing. The Mount Sinai Medical Center itself was not formally dedicated until October 20, 1968, after the school had opened. The administrative plan called for a president of the medical center, who served as the chief executive officer of the school and the hospital, reporting directly to the trustees. The dean and the director of the hospital would be vice presidents in the medical center and report to the president. The offices of the dean and the president would be held by the same person, originally George James.

During the early years, in deference to the long service to the hospital of Dr. Martin Steinberg, the director was allowed to retain his direct access to the trustees, and the office of president of the hospital officially remained empty. The plan was that at Steinberg's retirement in 1969, the president of the medical center and the school would also become the president of the hospital, with the new director reporting to him. But Dr. S. David Pomrinse, Steinberg's successor, fought this perceived loss of power for the director's office. Resentment and misunderstanding of the needs of the school grew in segments of the hospital administration.

On March 19, 1972, Dr. George James died suddenly of a heart attack. Dr. James had accomplished a tremendous amount in his seven years at Mount Sinai. The school's initial accreditation by the Liaison Committee on Medical Education was for seven years, a triumph that pleased Dr. James immensely. His sense of humor and management style had endeared Dr. James to the various constituencies at the medical center. His death in March, and the death of Solomon Berson, chairman of the Department of Medicine, a few short months later, sent shocks through Mount Sinai.

At Dr. James' death, Hans Popper was appointed acting dean and president and was later formally installed in these offices. But Dr. Popper had no great desire to remain in these positions. He had recently retired as the chairman of the Department of Pathology and was looking forward to serving a Fogarty Fellowship at the National Institutes of Health. He urged the rapid formation and success of a search committee to replace him.

While speaking to Dr. Thomas C. Chalmers at the National Institutes of Health, trying to explain his delay in serving the Fogarty Fellowship, he discussed his dilemma. Then, as if struck by a sudden inspiration, he inquired if Dr. Chalmers would be interested. A few weeks later, Dr. Chalmers accepted the trustees' invitation to become the third dean and president of Mount Sinai.

The Chalmers Years, 1973–1983

When Dr. Chalmers assumed his position at Mount Sinai late in 1973, it was already clear that the 1970s would be very different from the 1960s. Federal money was drying up, inflation taking its toll, the competition for grant funds increasing. Research was threatened as equipment grew older without the expected government funds to replace it; space in the long-awaited and still new Annenberg Building quickly filled. At the same time, the aging hospital facilities needed refurbishing and rebuilding. The school's basic science and research component suffered further from the still unresolved crisis in identity that the medical center was undergoing: hospital or school first?

During Dr. Chalmers' ten-year tenure, 13 new appointments were made on the department chairman level. These vacancies were viewed as opportunities, as well as challenges, but the continuous upheaval added to the growing pains of the school. Both Medicine and Surgery were vacant when Dr. Chalmers arrived and were filled the next year. Nine other chairs were later filled: Pediatrics (1976), Dermatology (1975 and 1979), Ophthalmology (1975), Pathology (1978), Radiology (1978), Anesthesiology (1979), Administrative Medicine (1979), and Obstetrics and Gynecology (1981). Physiology became vacant in 1979, and an acting chairman remained until 1984. Urology was without a permanent director from 1982 until after Dr. Chalmers left.

Under Chalmers' direction, two new departments were created—Biostatistics in 1975 and Geriatrics in 1983. Both were innovations. The Department of Geriatrics was the first in a medical school in the United States. The Department of Biostatistics, now called Biomathematical Sciences, has had a difficult road to acceptance at the school, but with a new chairman it has become active both in its own research projects and as a collaborator in projects with other school departments.

Dr. Chalmers' goal was to establish Mount Sinai as a true academic center. Because the school was still young, this effort was mostly internally centered. James' tenure had established the groundwork, but other layers of the structure, such as governance, salaries, the ratio and roles of full-time and part-time faculty, still needed attention.

Chalmers struggled against the continuing belief held by some that strong education and research programs took something from the hospital and patient care. When Dr. Pomrinse retired as director of the hospital in 1977, he was succeeded by Samuel Davis. Mr. Davis, the first hospital director since before 1904 who was not an MD, had a management background and worked with Dr. Chalmers on a major planning effort involving trustees, administration, and staff. This long-term effort, including nine months devoted to defining the medical center's mission statement, helped stimulate thinking on the roles of the hospital and the school. Yet, even with this reevaluation and airing of the needs of the school, Dr. Chalmers remained the president of the medical center, while Sam Davis ultimately assumed the title of president of the hospital.

Formal planning and evaluation was a theme throughout the Chalmers years. The Clinical Excellence Committee, which operated from 1974 to 1976, exhaustively reviewed the programs and activities of the medical center. Their report led to the establishment of a program of departmental reviews by outside experts, using self-study reports (14). The Clinical Excellence Committee report also served as the basis for the voluminous self-study performed for the Liaison Committee on Medical Education (LCME) site visit of February 1977. Mount Sinai became the first medical school in the country to receive a ten-year accreditation using the self-study model.

Many other studies were done during this time. In 1978 a study focused on Mount Sinai, "Chartbook of the Mount Sinai Academic Health Center in the 1970's," was published by Mount Sinai. Other academic health centers were later surveyed to give the planners at Mount Sinai an idea of the directions sister institutions of comparable resources and ambitions were taking.

During the 1970s, faculty relations were a pervasive concern. The voluntary faculty were deeply unhappy over the perceived lack of appreciation of their role. Of more immediate importance to this segment of the school were the deterioration of clinical facilities because of the budget crunches, and the weakening of hospital support services and amenities for patients.

The full-time faculty were troubled by fiscal restrictions and, for those interested in clinical practice, flaws in the medical service plan. Indeed, medical practice by full-time salaried school employees had been a continuing issue of concern at Mount Sinai. Unfair competition, potential exploitation, diversion from academic, scientific, and teaching duties were among the problems cited. The first practice plan was proposed in 1969 and was greeted with near-universal dissatisfaction. Groups met frequently over the next few years to devise something better, succeeding in 1973 with the Medical Service Plan. In 1974–1975, this program was reviewed by the Clinical Excellence Committee. A revised plan, issued in 1976, remains the basis for the Faculty Practice Associates (a new name chosen in 1981) that is in effect today.

Over, above, and around all of these issues runs the thread of funding and the threat of its loss. Government funds were cut back throughout the decade in such areas as capitation, financial aid, construction grants, equipment, and research monies. The City University's fiscal problems did not have a harsh impact on the School—two of the ten faculty positions funded by The City University were allowed to stay vacant when the incumbents left. One of these positions was reestablished in 1984/85. Budgeting became a continuing topic for meetings and newsletters. By 1979/80, shortages for the year were predicted and sacrifices were urged. There was a concurrent push to retrieve more of the available grant-funding pie.

The uncertainty of government support gave urgent impetus to the tough planning efforts outlined above. Scrutiny was brought to bear on the aging clinical facilities and cramped research quarters. From this grew the hospital rebuilding program aimed at improving patient care areas and, in addition, at freeing and modernizing some research space. A new fundraising campaign was initiated to support this rebuilding and to increase the endowment funds of the school.

By 1982 Mount Sinai appeared to be at the end of the beginning. With the rebuilding plans, the changed regulatory environment, and the now established maturity of the school, Mount Sinai seemed at a watershed, poised for a new start toward the recently defined objectives.

One aspect of this was the desire of the trustees to separate the offices of dean and president, with the president as the chief executive officer of all three Mount Sinai institutions, as had been the original 1960s plan. To do this, a change in leadership was made. Dr. Chalmers retired from his administrative duties to become, as he remains, a Distinguished Service Professor of the school. Samuel Davis left later in 1983.

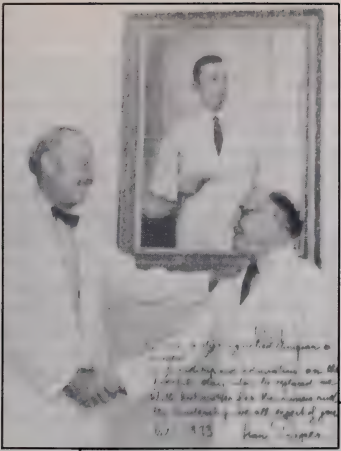
After a nationwide search, in June 1983 Dr. James Glenn became president of the three institutions and acting dean of the school. In July 1984, Dr. Lester Salans was named dean. This appointment did not last into the fall, and Dr. Glenn resumed the position of acting dean. Mount Sinai again began the search for a leader for the school, in 1985 appointing as dean Nathan Kase, who had been the chairman of Mount Sinai's Department of Obstetrics, Gynecology and Reproductive Science.

The Mid-1980s

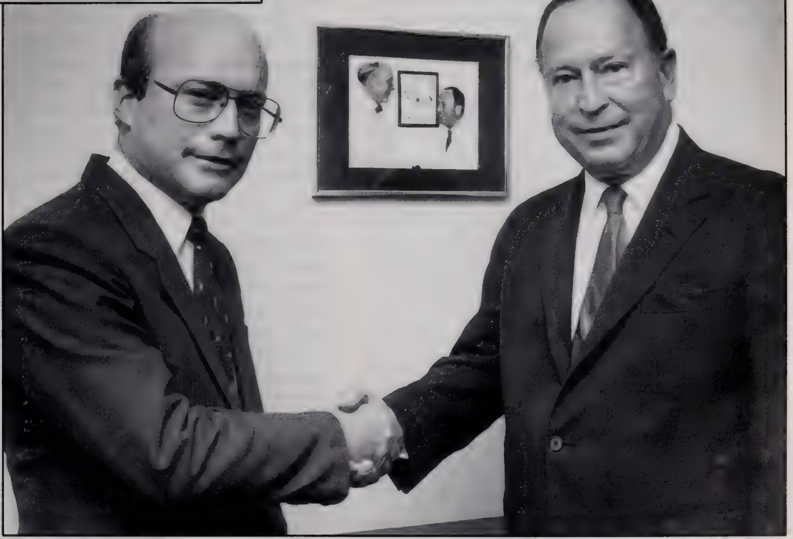
The last six years at the Mount Sinai School of Medicine have been marked by a new tone of growth, achievement, and looking outward. Many internal problems were resolved under Dr. Chalmers, allowing the arrival of Dr. Glenn to usher in a new period of pro-activeness.

The rebuilding of the hospital and an extensive marketing campaign signalled Mount Sinai's more aggressive stance, as did the early participation in the Maxicare Health Maintenance Organization, as HMOs first entered New York State. This eagerness to experiment and lead is also witnessed in Mount Sinai's applications to New York State to provide new medical procedures, such as liver, bone marrow, and heart transplants. The long-standing strength of Mount Sinai's programs in surgery, cardiology, hematology, and hepatology made these applications compelling, and, in the end, undeniable. These sophisticated procedures are supported by, and in turn enhance, investigations by other clinical and basic-science researchers at the medical center.

Multidisciplinary Research Programs. The deans of this period have emphasized a commitment to strengthening the basic sciences and the research efforts of the medical center. It was decided to build for the future by selecting a few areas of biomedical knowledge that held promise—such as molecular biology, the neurosciences, and immunology—and developing multidisciplinary research programs in these fields to serve



Thomas C. Chalmers, dean of the Medical School and president of the Medical Center from 1973 to 1983, with his predecessor, Hans Popper, dean and president from 1972 to 1973. In the painting, George James, first dean of the School of Medicine (1965–1972) and the first president (1968–1972) of the Medical Center, which was formally constituted in 1968. *Photographs from The Archives of the Mount Sinai Medical Center*



John Wallis Rowe, fifth president of Mount Sinai Medical Center, shaking hands with his predecessor James Glenn, president from 1983 to 1987 and acting medical school dean from 1983 to 1985. On the wall, 1983 photograph of Thomas C. Chalmers (left) shaking hands with James Glenn; behind them, 1973 photograph (see inset).

as a focus for growth. Although clearly a part of a trend of interdepartmental research cooperation that already existed at Mount Sinai, these multidisciplinary centers are pushing this trend further, as well as helping to define where these new disciplines will go.

An example of the impact of this trend in cooperation is the establishment of a Molecular Medicine Unit in the Mount Sinai Department of Medicine. This is in collaboration with one of the new multidisciplinary centers, the Brookdale Center for Molecular Biology. The unit is unique in its integration within both a clinical department and a basic science section.

During these years there has been a determination to create a more defined academic environment. This has resulted in the restructuring of some departments, with outside consultant panels invited to review departments. New appointment and promotion guidelines have been established, titles reviewed, handbooks revised.

In June 1987, Dr. Glenn submitted his resignation, in part in response to the fallout from the heart transplant that was performed at Mount Sinai prior to the receipt of official State Certificate of Need approval. Dr. Glenn, as chief executive officer, accepted the responsibility for this error.

In 1987, Mount Sinai began another long search for its second chief executive officer and fourth high-level appointment in as many years. On December 6, 1988, John Wallis Rowe, MD, was inaugurated as the fifth president of the Mount Sinai Medical Center.

Curriculum

The Mount Sinai concept received a great deal of attention in the 1960s as a new kind of philosophy in the training of physicians. The curriculum plan that was created in a spirit of opportunity and innovation—the first hospital in half a century to form a medical school, educators with a clean slate on which to write their courses—had to change many times over the years to match the realities of financing, territorial disputes, and student and faculty desires. The course schedule and content today are different from the original form; the statements of philosophy behind the curriculum remain incredibly similar.

For the first two years of study, an Introduction to Medicine course was developed. It was originally assigned 468 hours in the curriculum (15). A goal of this course was to allow the students to see the relevance and interdependence of the basic sciences and the clinical sciences. Patient contact began in the first year. Teaching was multidisciplinary and system oriented. The laboratories were also multidisciplinary; teachers came to the students' lab, the one students could claim as their own study and research space, instead of the students travelling to many different labs. The Community Medicine and Psychiatry departments were active in instruction, helping to provide the humanities component that was viewed as vital to developing physicians for the future.

A concentration of the basic science courses freed time for the students to take electives, allowing them to work closely with physician mentors to begin early to explore the special areas of medicine that interested them, and to learn what it was like to be a doctor. Some of the basic science instruction time was retrieved by science lectures in the clinical years.

Problems quickly developed with the teaching program. The multidisciplinary courses required a great deal of time and coordination from the faculty, either in teaching or in serving on subject-area committees. Some departments were loathe to give up their specific time to an integrated approach. In addition, interaction between the basic science and clinical people did not always go smoothly.

The real blow that caused a scaling back of the integrated courses came toward the end of Dr. James' tenure, when money problems forced more and more faculty time to be devoted to practice. This, along with the continued shortage of space as the opening of the Annenberg Building was pushed back, prompted the dean to note (as recorded in departmental chairman minutes) that they were offering a "stripped down" course to the students.

With each adjustment of the curriculum, Mount Sinai moved toward more traditional teaching models, but some of the innovations that made Mount Sinai distinctive were retained. One was the practice of anonymity of student grades. Originally it had been planned to give letter grades, but the first students protested that such grades created too competitive an environment. A pass-fail system allowing for anonymity was quickly adopted, a feature unique among medical schools to Mount Sinai.

Another innovation that continues is the tradition of recruiting a diverse student body, including students who may well have something special to bring to a career in medicine that is not shown by standard scholastic measurements. The search includes accepting American students in foreign medical schools with advanced standing into Mount Sinai's third-year class, and an Educationally Disadvantaged Students program to help any and all students who need help to get started in medical school, or who have developed academic difficulties along the way. Over the years, the students have also played a large, if not always easy, role in curriculum development and course evaluation.

As Mount Sinai entered the 1970s and sources of government support began to contract, fewer new faculty members could be hired. This gave the full-time faculty less time to devote to research, even as fiscal problems were demanding that they spend more time in practice or grantsmanship to make up for budgetary shortfalls. The clinical faculty had to be relied upon more heavily for teaching.

Adding to this worsening situation was Mount Sinai's commitment to the federal government at the time the building grant was received to accept a first-year class of 100 students as quickly as facilities allowed. This meant that as the class size grew, the affiliated hospitals and staff had to bear a heavier part of the teaching load.

The affiliates—The Mount Sinai Hospital, the Bronx Veterans Administration Medical Center, Beth Israel Medical Center, the City Hospital Center at Elmhurst, the Jewish Home and Hospital for Aged, and North General Hospital—are all vital components of the teaching program of the school. The development and coordination of the multisite teaching programs were an important element in the 1970s and 1980s.

One curricular deficiency that troubled Dr. Chalmers and his successors was the dearth of computers and computer-assisted instruction for students. This gap has been met in part by a self-testing program developed at Mount Sinai for the surgical subspecialities. A recent 20% reduction in formal lecture time in the first two years of medical education is intended to allow the students time for more self-instruction and study using these computer-assisted programs. Space and financing remain limiting factors in the speed of future developments in this area.

Humanistic Medicine

The Mount Sinai concept was distinctive, in part, because of the emphasis put on the humanities and the value of community medicine. Although the road has been bumpy—several instances of student cheating in the 1970s, a 1977 self-study report for the LCME visit which noted a seeming lack of teaching in the behavioral sciences—again and again Mount Sinai's leaders have affirmed their commitment to moral values in medicine.

In the mid-1970s, the students began a project called HUMED to provide them with the humanities input they felt was lacking. The students' HUMED effort grew into a larger effort by the Department of Medicine for undergraduate and graduate students, with co-teaching by psychiatrists and an ethicist, one of the first in a department of medicine. In 1988, an ethicist was formally added to the school faculty.

In 1987 the Humanities and Medicine Program was established with five leading undergraduate universities to encourage students majoring in the liberal arts to consider a career in medicine. Students hear special lectures on the ethical issues in medicine and spend the summers after their sophomore year at Mount Sinai in laboratory and clinical functions.

Research

The Mount Sinai Hospital had always been known for its strong research programs. This reputation was part of what made the institution so attractive a base on which to build a medical school. It was hoped that with the school, in particular the Graduate School for Biological Sciences, there would result an even higher level of research activities, grant funds, and scientific contributions.

In an interview in 1987, Dr. Popper stated that he felt that the basic sciences had not yet achieved the same level of excellence as the patient care and teaching components at Mount Sinai. He felt that biomedical research had been the "invalid" of the three-part mission of education, patient care, and research (16).

The reasons behind this are varied. One is that the financial troubles of the 1970s caused delays in purchasing needed equipment. Research space was, and until the full opening of the new patient pavilion will remain, inadequate and inhibiting. It is also true that New York City has become an expensive and difficult area to which to attract faculty, in particular basic scientists, who do not earn the base salaries or augmenting practice fees of clinicians. To many potentially high-quality recruits, the city in 1989 is not an appealing place to buy a home and raise children.

Still, the School of Medicine has accounted for a number of significant contributions to medicine in its first 25 years and is justifiably proud of the people and programs involved. These include Dr. Popper's own work in liver disease, as well as the contributions of others in the hepatology program; the work by Dr. Irving Selikoff and the Division of Environmental Medicine in the Department of Community Medicine, including the tumor-causing effects of asbestos; important genetic contributions, especially in the mechanisms and treatment of Jewish genetic disorders; Dr. Panayotis Katsoyannis' development of synthetic insulins; Dr. Melvin Yahr's pioneering efforts in the assessment and treatment of Parkinson's disease.

There has been continuing work on areas of long-term interest at Mount Sinai, such as inflammatory bowel disease, cardiology, and the treatment of cancer. This includes research by the late Charlotte Friend on in vitro differentiation of tumor cells into normal cells.

Other valued contributions include George Acs' replication of the hepatitis B virus in tissue culture; Edwin Kilbourne's efforts, later in association with Peter Palese, on the genetic organization of the influenza virus and the development of a vaccine against this virus; Jay Unkeless' research on the cloning and crystallization of immunoglobulin receptors; and Yale Nemerson's work on genetic organization and cloning of blood coagulation factors.

Conclusion

The Mount Sinai School of Medicine of The City University of New York has now graduated over 1,800 physicians and 200 combined MD-PhDs and PhDs from the Graduate School. The school recently received another ten-year accreditation; the current fund-raising campaign has lifted the school's endowment funds to among the highest in the nation; grant funds are increasing. These are all signs of health and, yes, success.

In this brief overview of Mount Sinai's early years, it is not surprising how different everything is today. It should not be surprising how many things remain or return to be the same. Today, with the building and rebuilding of Mount Sinai, there is a feeling much like that during Dr. James' years. There is again the excitement of starting over, being new. This brings with it many strains, but there is the perception that Mount Sinai will be strong as it enters a new era, still a leader in American medicine.

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Residency Training Programs Then and Now: Surgery

ARTHUR H. AUFSES, JR., M.D.

Resident training has been irrevocably transformed in the past quarter century by a multitude of forces: techniques, technology, an altered view of medicine by society, a changing medical economic climate, and an increasing bureaucratic regulation of the profession. The goals in surgery residency training, however, remain the same: to produce a skilled, safe, technically adept surgeon with keen judgment, dedicated to the welfare of his or her patient. In addition, the Mount Sinai program strives to develop the teachers and leaders of the profession who will search for and advance knowledge in surgery.

Since I was on the house staff in 1954 I would like to make a few comparisons over a thirty-five year span. In 1954 the salary for an intern was $25 a month, and for a chief resident $50 per month. The current chief resident's salary is $36,000 per year. Our house staff in 1954 numbered 21, and we were responsible for covering a service of about 100 beds; we worked only at Mount Sinai. Now our surgical house staff numbers 75 and they are responsible for covering a total of about 300 beds at three institutions—Mount Sinai Hospital, City Hospital at Elmhurst, and the Bronx Veterans Administration Hospital. Without these latter two rotations the training program would be inadequate.

Of our total complement of residents, 6 per year will complete the general surgery training program. The remaining residents spend from one to three years in our program, receiving core education in general surgery. They then go on to residencies in the surgical specialties. Currently over 75% of our graduating chief residents also take additional training in surgical subspecialties such as cardiothoracic, vascular, pediatric, plastic, or transplant surgery.

About 10 years ago, the residents' on-duty schedule was changed from every other night to every third night, to provide a little more free time and better working conditions for the house staff without adversely affecting continuity of care.

Changes in Operative Management

As I think about it, clinical investigation and randomized trials have brought about striking, even revolutionary changes in operative management of common surgical conditions. Twenty-five years ago our residents routinely performed radical mastectomy for breast cancer, and gastrectomy with or without vagotomy for peptic ulcer disease. A portocaval shunt was the operation of choice for bleeding esophageal varicies; residents were proficient in the performance of these procedures. Over the past quarter century, radical mastectomy has been replaced, first by modified radical mastectomy and now by quadrantectomy or lumpectomy with or without axillary node dissection. The advent of H2 blockers has reduced the performance of gastrectomy to an operation carried out almost exclusively on patients with carcinoma and lymphoma of the stomach. Yes, we do operate on an occasional peptic ulcer patient, but it is primarily for the complications of the ulcer rather than for what used to be the most common indication for surgery—intractable

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pain. Portocaval shunting is now limited to those patients who have recurrent bleeding after endoscopic sclerotherapy.

Some operations have disappeared from our armamentarium, and new procedures have come along to take their place. In gastrointestinal surgery, for example, proctocolectomy and standard ileostomy was superseded by proctocolectomy and continent ileostomy for some patients. Today abdominal colectomy and mucosal stripping and ileoanal pull-through with a pouch is the preferred operation for most patients with ulcerative colitis. Strictureplasty for Crohn's disease, first described in 1981, has become an operation that has enabled surgeons to preserve segments of diseased bowel that formerly would have been resected. One can think of many operations commonplace today which were either experimental, unheard of, or just getting under way in 1964. These would include kidney, heart, and liver transplantation, bone-marrow transplantation, partial splenectomy, vascular bypass to distal vessels, coronary artery bypass grafting, and many new intracardiac procedures.

Evolving Technology. Unquestionably many of these changes have to do with evolving technology. For example, in 1964 endoscopy was limited to the use of rigid sigmoidoscopes, esophagoscopes, gastroscopes, and bronchoscopes. Today the total bowel enteroscope going down from above meets the colonoscope at the ileocecal valve. Twenty-five years ago microsurgery was in its infancy. Today it is used by a multitude of surgeons and surgical specialists. Twenty-five years ago arteriography was crude and dangerous in comparison to what it is today. Sonography, CT scanning, magnetic resonance imaging, and percutaneous transhepatic cholangiography did not exist. Today our radiologists can opacify almost every vessel in the body and image every organ.

As an example of the value of new technology, one need look no further than the diagnosis of the etiology of jaundice. A good history and physical examination remains as crucial to diagnosis today as it was 25 years ago, but laboratory confirmation of hepatocellular dysfunction was limited to the cephalin-flocculation test (no longer performed today under any circumstances). The upper gastrointestinal roentgenogram would be diagnostic if the "inverted three" sign of pancreatic head carcinoma was present, and a celiac angiogram might demonstrate vascular encasement indicative of unresectability. Neither oral cholecystography nor intravenous cholangiography could be attempted in the presence of an elevated bilirubin. As a consequence laparotomy was frequently performed without a sure diagnosis.

Today abdominal sonography is usually performed before the blood test results have been returned, and diagnosis of a surgically correctable obstruction can be confirmed in a matter of hours by a combination of new imaging techniques such as CT scanning, endoscopic retrograde cholangiopancreatography, transhepatic cholangiography, and percutaneous biopsy, none of which were available in the early 60s.

Other incredible advances have enabled us to do more extensive surgery with relative safety and excellent results. These advances include the use of invasive monitoring in our intensive-care units, the advent of total parenteral nutrition, and the newer antibiotics. At breakfast the other morning talking about this manuscript with colleagues, we agreed that in 1964 the available antibiotics included the sulfonamides, penicillin, streptomycin, tetracycline, aureomycin, and chloromycetin. The latter was rarely used because of its toxicity. Today most surgeons and infectious disease specialists would not dream of using any of those drugs, either singly or in combination, but would go right to the newer generations of antibacterial agents.

From Ward Service to Teaching Service

In 1964 a large ward service was still the major training ground for surgical residents. The current Falk Pavilion housed wards Q, R & S, T, and U. Ward Q was the male and Ward T the female surgical ward. R & S housed urology and surgical specialties, and U was the gynecology service. Each of the floors had a 26-bed open ward and isolation rooms in the back corridors. The ward service was resident-run; the attending staff was available for teaching rounds, guidance in patient care, and assisting in the operating room. Most patients were admitted via the Emergency Room or the clinics. A few patients would be referred by a private physician because of major complications which could not be well handled either in other institutions or in the private and semiprivate pavilions of Mount Sinai Hospital. The resident staff assigned to help with the care of private and semiprivate patients were not involved with patients on the ward service. Residents did rotate between the private and the ward service, but the chief resident spent all of his time on the ward service. Teaching rounds on the ward were formal, regularly scheduled, and attended by all house staff and attendings on the individual services. On the private service, teaching rounds were totally dependent on the relationship between the attending surgeon and his residents.

In 1965 the advent of Medicare and Medicaid radically changed the need for a large ward service. Suddenly a large number of patients in the metropolitan area who did not have third-party insurance and who could not afford private care were able to make a free choice of physician, knowing that their care would be paid for. In short order the ward services as we knew them disappeared and were replaced by teaching services, which were a combination of private, semiprivate, and a few clinic patients amalgamated into one unit staffed by a team of residents and attending physicians. The old surgical wards were renovated and became the pediatric pavilion. On teaching rounds it was now impossible to know who was a semiprivate patient and who was in fact the rare clinic patient. Because of the need for surgical residents to perform surgery, a change began to occur: the attending staff had to allow the residents greater responsibility for the preoperative, perioperative, and postoperative care of their private patients.

At first many of the attendings were reluctant to allow this type of resident participation and responsibility. At that time, patients would frequently ask the attending, "Are you going to do the operation?" The question is rarely asked today. Patients know that in a teaching institution they will get better care and they also understand that the residents have a major role to play in their care. Whereas resident responsibility in the care of private patients used to be subterfuge, it is now in the open. In fact a clause of the mission statement of The Mount Sinai Hospital notes that every patient is a "teaching patient."

Other Changes

Doctor-Patient Relations. As one looks back twenty-five years, other major differences in surgical care and resident training are apparent. Patients were rarely told that they had malignant disease, and the surgeon made all decisions for the patient and the family. Today patients are invariably informed of the diagnosis. In addition all treatment options must be carefully explained, and the patient plays a major role in the decisions regarding therapy. In 1964 there was little concern about patient rights and possible ethical issues which arose in departments of surgery. Today an ethicist makes rounds regularly and plays an important role in our teaching activities.

Length of Stay. Twenty-five years ago, patients were allowed to remain in hospitals for an almost indefinite period of time. Today economic considerations and bureaucratic regulations forbid many patients from being admitted to the hospital. Ambulatory surgery and day-of-admission surgery now account for over 50% of the volume of work on the surgical service. Under pressure from funding agencies, lengths of stay within the hospital have dropped significantly, most markedly within the past two years.

A Changing Mix. And finally one must note the changing mix of surgical residents. The surgical house staff of 1964 was all male. The first women to finish the surgical resident training program graduated in 1978, and since that time the program has always had a significant number of women. This author wishes that more women would opt for a career in surgery or a surgical specialty.

Looking Back Entails Looking Forward

The surgical resident of today has marked advantages over his or her counterpart of 25 years ago. Advances in technology, drugs, techniques, and medical science enable the resident to render patient care at a level never dreamed of in 1964. In addition, we are fortunate in having an outstanding group of dedicated attending surgeons who have adapted to change and who, by their teaching, enable us to maintain an effective and relevant program for the training of highly qualified surgeons.

It is hard to look back without looking forward. Just as the professors of today were the residents of a quarter century ago, our current residents will be the professors of the 21st century. I have no doubt that surgery in the year 2014 will be as different from today's surgery as today's surgery differs from 1964. I hope that I will be able to see for myself what changes do occur.

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Residency Training Programs Then and Now: Medicine

ALVIN S. TEIRSTEIN, M.D.

The year 1953 was highlighted by two landmark events in medicine: Watson and Crick described the configuration of DNA, and I arrived at The Mount Sinai Hospital.

During the next six years Mount Sinai was my home. Although we were married, Alice and I viewed that time as an extended courtship. Kissing her goodnight at our door after she had joined me for the "free" 9:00 PM meal, I returned to night call—every other night, after every other night. To this day we subtract three years from the duration of our marriage, in memory of those every-other-night and weekend duties.

I have been asked to compare my house staff days with those of the current house staff. Musing on 1953 and my memories of the next six years, the impossibility of that task is evident. A few years ago Alice and I attended our undergraduate college's 25th anniversary. It was a disaster. We were shocked not only by the sight of all those rapidly aging faces, but also by the realization that the revered institution we knew so well was gone, replaced by new buildings, new goals, and new, very young people. Similarly, at Mount Sinai the physical environment has been, and is being, drastically altered. The role of the hospital in the community has changed from a hallowed citadel for the sick to a much maligned all-purpose neighborhood walk-in clinic, nursing home, hospice, and quick-fix surgical center—as well as a 21st-century cardiac and organ transplant center. And the faces get younger and younger. You can't go home again, and you cannot compare now and then.

An ominous sign of my forthcoming life at Mount Sinai greeted me on the day of my arrival. I was, and almost remain, the average-sized everything. All things made by computer-directed Asian hands fit me perfectly. I learned the basic level of Mount Sinai efficiency when Mel Kahn, my somewhat outsized co-intern, emerged smiling from the uniform room with a year's supply of what appeared to be Gucci-fitted whites. Mount Sinai did not have my size.

My Day

Our introduction to the ward began with the elevator. A sneering achondroplastic whose luetic aneurysm eventually ruptured during one of his tirades informed me that house staff walks up stairs. Ward K (on the 5th floor) consisted of one huge Dickensian rectangular room lined with beds on all four walls (the Falk Intensive-Care Unit was the last remnant). Twenty-six voices in varying accents pleaded their individual causes: Dr! Dr! Oiy! Oiy! or (in that unique Hungarian reversal) Yoi! Yoi! The first hour of our day consisted of drawing blood and starting intravenouses, while patient rounds were conducted by the assistant residents (PGY2s). The morning terminated in the dreaded call of the chief resident, "Chart rounds!" This exercise consisted of the chief resident and assistant residents discussing each patient. The chief always made startling discoveries: "Mrs. Brown has not had a BUN in three days!" At this point the interns were expected to rush to the rescue. Bang!

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slammed the hand-driven addressograph stamper, and Mrs. Brown was saved.

Lunch consisted of the dried sandwich your co-intern had made for you at the previous 9:00 PM meal and a dash to the radiology department. There, we were introduced to the wizardry of Arnold Sheridan—he was the file clerk—who knew every patient's number and the location of each film, and of Mancho Khilnani and Archie (really Arthur) Lautken, who translated shadows of every shade and shape into meaningful information.

At 2:00 o'clock it was time for Attending Rounds, one of the great joys of the day. I have never understood why physicians are granted their M.D. on graduation from medical school. Medicine is, or was, learned by apprenticeship to great physicians. Attending Rounds were a taste of the value and excitement of that experience. Nothing interfered with rounds made by King and Levitt, or Horn and Elster, or Soffer and either one of the Bader twins, or by almost any one of the dynamic, perceptive, and incisive duos who devoted thousands of hours to making us doctors. Rounds were hallowed. The doors were closed and no one dared to trespass.

Although patients may have arrived throughout the day, the house officer did not begin his or her (very few were "her") encounter with the patients until attending rounds were completed, usually after 5:00 PM. An empty bed on the medical service was a treasure to be fought over by the attending staff. The chief resident was king. Although the patient population was often somewhat skewed by the interests of the chief resident, we knew no crocks. I remember one hardhearted resident, destined to become a famous cardiologist, refusing an admission with the declaration, "I don't want another lupus, I have three already." We rarely had more than two admissions a night. In part that magic number was achieved by a uniquely Mount Sinai rule. The first two admissions were to be "worked up" by the intern; all subsequent admissions were the responsibility of the assistant resident and occasionally of the chief resident. Yes, patients were admitted for a "workup." A pain, a mass, a cough, a murmur, organomegaly, fever, hair on a lady's chest—all were valid reasons for admission, which usually meant several weeks in hospital.

My second obeisance—second only to my attendings—is to my chief residents, Les Hollander and Jonah Kosovsky, whom I hold in great, everlasting reverence. The chiefs came alive after the 9:00 PM meal, made an assessment of your newly admitted patients, and pronounced: "I will meet you and your patients in the fluoroscopy room at 11:00 PM." This set off a frantic search for the elevator, which had been shut down at 8:00 PM. Fluoroscopy was on the 3rd floor, ward K on the 5th. If we could not break into the elevator, up and down the stairs we would go with dyspneic Mrs. Schwartz and Mrs. Brown. I am quite certain that Arthur Master devised the cardiac stress test while he was an intern at Mount Sinai. With our patients finally tucked or tied in bed, the chief resident assumed a professorial air. If Mrs. Schwartz had arthritis, he would ask, "Tell me about the arthritides." If Mrs. Brown was anemic we would talk about the anemias, until 3 or 4:00 AM.

If Columbus had been a surgeon
he would have
fallen off the earth

Some of us managed a few hours sleep before the 7:00 AM bugle for the next day, but most joined the endless, on-going poker game which had started in antiquity—probably when Mount Sinai was The Jews' Hospital on Lexington Avenue. As long as Arthur Sicular was playing, you could amass a small fortune.

Surgical Rotation: The True Meaning of Abdominal Exploration

Mine were the last great days of the rotating interns. Four months of medicine were followed by one month on the surgical wards (direct referral) and one month on private surgery.

On the surgical wards, the intern admitted all patients, performed urinalyses and blood counts, started intravenouses, passed nasogastric tubes, and languished for long hours on the handles of retractors, responding to the resident's cry, "Pull harder. I can't see a thing." No wonder every postgastrectomy patient had left lower lobe atelectasis.

Private surgery meant admitting everything from varicose veins for Dr. Robert Nabotoff to esophagogastretomies for Dr. John Garlock. Surgery is where I learned the true meaning of abdominal exploration. Fortunately, autopsies were still in vogue and uncovered all the pathology hidden in the dome of the liver during those "explorations." If Columbus had been a surgeon, he would have fallen off the earth.

It was the heyday of subtotal gastrectomy for duodenal ulcer. Dr. Leon Ginsberg had devised a preoperative ritual particularly fiendish for both patients and interns, which consisted of the oral passage of a garden hose called an Ewald tube into the stomach of the five or six ulcer patients awaiting surgery. This torture continued nightly until the gastric tone was adequate for resection. I still cannot eat goose pâté after that medieval experience shoving tubes down patient's gullets.

I requested that I spend my private surgical month on the Garlock service, an unforgettable experience. I committed several cardinal sins, among them starting the intravenous in the right arm of a cholecystectomy patient. On my last day scrubbed with Dr. Garlock, my knuckles raw from the daily raps he administered because of my poor retraction, his blue eyes twinkled over his mask as he said, "Teirstein, I just heard great news. You're going into internal medicine." When I eventually began practice, his mother became one of my first patients. I was never quite certain if this was a measure of his respect for me, or an expression of how he felt about his mother.

On to orthopedics, urology, gynecology (there was no obstetrics at Mount Sinai in 1953–54), pediatrics, and neurology, which meant exposure to a pantheon of greats (Lippman, Oppenheimer, Goldberger, Hodes, and Bender) and an army of soon-to-be-greats. The value of that experience lives on. I learned that "minimal blood loss" when repairing a fractured hip translates to at least one liter, and that Little Jack Horner was training to perform suprapubic prostatectomies. I also attained the basic skills required to be an internist who accepts responsibility for the whole patient.

The Second-Year Electives: Apprentice to a Giant

I will not delve deeply into the subsequent years of assistant and chief residency. A few observations are germane. During the second year we were offered a single three-month elective. The choices were cardiology, pulmonary, hematology, or gastroenterology. These were not two- to four-week dilettantish forays, but a chance to apprentice to a Mount Sinai giant. In truth, each subspecialty service was one man; everyone else was a shlepper. My three months with Dr. Coleman "Kelly" Rabin decided my future career. The same could be said of those residents who eagerly attempted to imitate the performance of Henry Janowitz, Lou Wasserman, or Charlie Friedberg.

Chief Residency

Before becoming chief resident, it was expected that you would spend at least one year away from the medical service. Since Genesis, the tradition at Mount Sinai was to work in the pathology laboratory of the great Paul Klemperer and Sadao Otani. However, medicine was changing in 1954. When I announced to Dr. Rabin that I had chosen to study physiology in the cardiopulmonary laboratory instead of pathology, Kelly responded, "You will never amount to anything." As usual, Kelly was right.

Thus, the chief resident came to his post armed with at least one year of completed fellowship, in addition to two years of internal medicine. He shared two wards, one male and one female, with his co-chief. The chiefs were staggered so that one term ran from January to January, the other from July to July. The chief was on duty every other night and every other weekend for 12 months. When he completed this intensive period of training, he was confident that he was the best physician in the world and could handle any medical problem. And he could.

I cannot recall a single vacation during those years. Vacations were a time to sleep and eat, to get acquainted with your family and what few remaining friends you had. I never saw a house staff officer returning from vacation with a tan. At $25 a month and all you could eat at the 9:00 PM meal, the Central Park boat pond was the Caribbean. If the ever-present sallow house-staff complexion turned to tan, you suspected Addison's disease.

Grand Rounds: You Sat as Close to the Podium as Possible

Conferences were an integral part of the medical service. It was unthinkable to miss or be late for medical x-ray conference, grand rounds, clinical pathology conference (our CPCs), or mortality conference. House staff, attending physicians, and local nonaffiliated community physicians eagerly crowded into one of the two Blumenthal auditoriums, one a classical Oslerian amphitheater crowning the Metzger Pavilion, the other a 300–400 seat gem, now abolished by the erection of that great educational addition to Mount Sinai, Ross Park. The doorway immediately to the right of the Radiology Associates Suite which leads to nowhere is all that remains

X-ray conference in Blumenthal Auditorium, "a 300–400 seat gem," conducted by Bernard Woolf, who was chief of radiology from 1949 to 1977. *Photograph © Look Magazine from The Archives of the Mount Sinai Medical Center.*

of the revered hall and is symbolic of our loss. No sea of empty seats separated the presenter from the audience. Communication is the essence of rounds. How can you communicate across an impenetrable moat? You were very much a part of this exercise and sat as close to the podium as possible. Didactic lectures were rare; grand rounds always began with a case presentation, and every death was presented at the monthly 7:00 PM mortality conference. An autopsy rate of less than 100% was unacceptable. CPCs were so exciting that Dr. Gutman and Otani held an additional separate monthly CPC for house staff. At the end of each year a volume of Cecil and Loeb went to the house officer who made the most correct diagnoses, and $5 to the one least often correct. The $25 I earned was one month's salary.

My Apples, Your Oranges

How can I compare the apples of my house staff days with the oranges of today's residency training? There is no question that eradication of the sadomasochistic life we endured is for the good. Total submersion in medicine for four to six years would not be expected to bring forth a well-rounded human being ready to assume an important societal role. Yet, John Garlock and Dorothy Krieger were superb pianists, Don Weissman still sings in concert, Saul Jarcho and Al Lyons are esteemed historians, and Buddy Hauser is an accomplished, often-exhibited photographer. Without my knowing, today's house staff may be equally productive. They are certainly producing young families and an army of joggers and tennis pros.

More importantly, I worry about how we are teaching medicine today. Hospitals have become pit stops for invasive procedures, chemotherapy, asthmatics who have little or no proper care, and the pathetic victims of AIDS. Acutely ill patients can no longer expect minimally adequate care on a general hospital floor. The explosive growth of intensive-care units is inversely proportional to the ability of hospitals to render care. No patient today is admitted for a "workup." Today's house officers no longer experience the pedagogic luxury and thrill of savoring and dissecting all aspects of a patient's medical problem. Too often, their goal is disposition rather than exposition.

Subspecialization and the Whole Patient

Although most of today's medical house staff choose a subspecialty fellowship after completing their requisite three years, most young physicians still will be required to perform as general internists during the first five to ten years of practice and will never be able to ignore the patient's multisystem complaints. Are today's graduates equipped to efficiently diagnose and direct the treatment of patients with chest or abdominal pain, an abnormal x-ray, weight loss, and/or anemia? Have we produced a cadre of physicians whose main function is to triage patients toward their favorite consultants?

Two recent episodes alerted me to the failing of our modern training of young physicians. One of my best fellows, a PGY5 about to enter private practice, returned ecstatic from a few hours watching Paul Kirschner perform a lobectomy. This was a unique, illuminating, and exhilarating experience for him. It was the first time he had been in an operating room since medical school! From now on, all my fellows will spend time in the OR. Another eye opener for me was the morning I found one of my patients in agony with a bladder above his umbilicus. When I irately questioned the very attentive PGY1, who had been called several hours earlier, on why he had allowed this patient to suffer for so long, he stated that he was equally upset and had been paging the urology resident for hours! I assisted him in performing his first urethral catheterization.

Clearly we are failing our house staff when we give them a certificate signifying the satisfactory completion of their training while they lack some of the basic skills required to be an internist. Of course, medicine has changed, and will change further as the years pass. However, until every patient receives a CT and PET scan on admission, and a computer can take a history and digest all of the data yielding a diagnosis and treatment plan, physicians will still be required to perform their craft, arrive at correct diagnoses, and prescribe treatment. They must be able to pass a Foley catheter. At Mount Sinai we are fortunate in having state-of-the-art major services under one roof and a huge cadre of superb internists and surgeons practicing medicine on campus, or within a fifteen-minute walk. We should be utilizing that enormous talent bank and extended campus to train house staff for the year 2000.

In looking back at my years of training at Mount Sinai I am certain that I am amnesic for the agony. Undoubtedly, I suffer from "the good old days" syndrome. I doubt that it ever was fun—although I did enjoy the poker. But I fear what would have happened to the thousands of sick patients I have cared for if I had not had the opportunity, indeed—in the words of Dr. Gutman—the "privilege," to be a member of his house staff.

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The Educational Process at the Mount Sinai School of Medicine: The First 25 Years

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Abstract

Although the Charter for the School of Medicine was signed in 1963, and active recruitment of faculty commenced almost immediately, the recruitment of students, in fact, did not begin until several years later, with admission of a first-year and a third-year class in September 1968. From that time to the present, the class size has increased from a small, carefully selected group of 36 first-year students to its current size of 115 students in each of the basic science years and 132 students in each of the clinical years.

As one might imagine, over the ensuing two and a half decades, many changes have occurred in every aspect of the educational process. Throughout these years the School of Medicine has evaluated and reassessed its goals and objectives in order to continue to make the study and practice of medicine not only exciting but also meaningful and to advance knowledge of the scientific origins of disease and the quality of health care. This paper reviews the evolution of this process at the School of Medicine as well as outlines our educational agenda for the next decade.

Admissions

When the first, first-year class entered Mount Sinai in 1968, there were 21,118 students competing for 9,863 first-year positions in schools throughout the country (1). Although the School has recently experienced a drop in application activity since its peak in 1976, when we received 4,265 applications for 100 positions, we have been singular among medical schools over the past several years in that our applicant numbers have remained relatively stable (Table 1). In the years 1986–1988, we had 2,065 (1986) to 3,357 (1988) applicants to fill 115 positions. This occurred during the time that applications decreased nationwide by more than 25%. However, these figures are somewhat misleading, because in 1986 we joined the Association of American Medical Colleges Computerized Application Service, resulting in an increase in students filing a preliminary application with the school. Completed applications for 1988 numbered 2,352, and, to date, we have received more than 2,200 applications for the class entering in September 1989. Nationwide data suggest that the decrease in applicants may finally have halted, the 1989 nationwide pool containing 300 more applicants than in 1988 (2).

Although we have more than a sufficient number of applicants to fill our entering class, we have seen—consistent with nationwide trends—a progressive decrease in grade point averages (GPAs) of our applicants, and relative stability in Medical College Admissions Test (MCAT) scores (Tables 2, 3) (3, 4). Highly qualified candidates are eagerly sought by all medical schools; however, our accepted-to-enrolled ratio has not differed significantly; it was 2.9:1 in 1981 and increased only slightly, to 3.1:1, in 1988.

Although concern has been expressed over the capabilities of the students admitted, especially those accepted during the months immedi-

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TABLE 1
Applicants to Medical School, MSSM vs Nationwide, 1981–1988

	1981		1984		1987		1988	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Total								
MSSM	3,436		2,631		3,310		3,357	(2)*
National	36,727		35,944		28,123		26,721	(27)*
Women								
MSSM	1,235	(36)	1,038	(39)	1,294	(39)	1,371	(41)
National	11,673	(32)	12,476	(35)	10,411	(37)	10,264	(38)
Underrepresented minorities								
Black								
MSSM	154	(5)	155	(67)	215	(7)	243	(7)
National	2,644	(7)	2,620	(7)	2,203	(8)	2,160	(8)
Others								
MSSM	77	(2)	54	(2)	81	(2)	79	(2)
National	897	(2)	958	(3)	765	(3)	736	(3)

MSSM, Mount Sinai School of Medicine.
* Percent decrease since 1981.

ately prior to the start of the academic year, data suggest that such concern is unwarranted (Table 4). Those students admitted late have performed no differently from those considered most competitive and admitted to the School of Medicine earlier in the application cycle.

The demographic characteristics of our current class compare favorably with those nation-

TABLE 2
Academic Performance, MSSM vs Nationwide

	1981	1984	1987	1988
Science GPA				
MSSM	3.51	3.48	3.42	3.32
Nationwide	3.46	3.43	3.38	3.34
Overall GPA				
MSSM	3.56	3.52	3.47	3.41
Nationwide	3.50	3.48	3.44	3.42
MCAT Biology				
MSSM	9.75	10.34	10.21	10.00
Nationwide	9.66	10.06	9.86	9.6
MCAT Chemistry				
MSSM	10.18	10.27	10.05	9.89
Nationwide	9.69	9.83	9.55	9.37
MCAT Physics				
MSSM	9.83	10.50	10.01	9.95
Nationwide	9.65	9.95	9.61	9.99
MCAT Science Problems				
MSSM	9.70	10.12	10.15	9.80
Nationwide	9.61	9.87	9.59	9.35
MCAT Skills—Reading				
MSSM	8.44	8.79	8.68	8.68
Nationwide	8.94	9.09	8.84	8.68
MCAT Skills—Quant.				
MSSM	8.42	8.60	8.31	8.53
Nationwide	9.02	9.03	8.78	8.72

GPA, grade point average; MCAT, Medical College Admissions Test; MSSM, Mount Sinai School of Medicine.

TABLE 3
Proportion (%) of Matriculants by MCAT Distribution, MSSM vs Nationwide 1988

	MSSM	Nationwide
Biology		
Under 9	17	26
9–11	64	56
12–15	18	15
Chemistry		
Under 9	22	32
9–11	55	49
12–15	22	16
Physics		
Under 9	25	35
9–11	54	44
12–15	20	16
Science Skills		
Under 9	28	34
9–11	52	48
12–15	19	15
Skills: Reading		
Under 9	45	38
9–11	52	55
12–15	2	4
Skills: Quant.		
Under 9	50	43
9–11	38	44
12–15	11	9

MCAT, Medical College Admissions Test; MSSM, Mount Sinai School of Medicine.

wide (Table 5). However, of particular concern has been the drop in number, as well as academic credentials, of our underrepresented minority applicant pool, and the proportion of New York State residents in this pool. In an attempt to encourage applications to the School of Medicine, we have embarked on a number of programs targeted to both minority and nonminority students that commence as early as high school. All of these are coordinated through our newly formed Center for Excellence in Youth Education, which, in one academic year, may enroll high school and college students equal in number to those in our basic science classes (Tables 6, 7).

Curriculum

The curriculum of the school began to evolve almost as soon as the doors opened to students in 1968. However, three years ago an ad hoc committee was convened to review the curriculum. The impetus was not only internal; the Association of American Medical Colleges had earlier released a monograph criticizing existing medical school curricula and calling for a dramatic change in the way medicine was taught (5). To summarize the committee's recommendations (Table 8), it was suggested that the school embark on a program to (a) decrease structured curricular time; (b) facilitate independent learning through the use of computer technology; (c) promote seminar groups addressing problem-solving techniques; and (d) combine free-standing courses, where appropriate, to produce an integrated, cohesive curriculum that would cut across disciplines previously taught as separate courses.

All of the committee's recommendations were taken quite seriously by the Executive Curriculum Committee and were strongly supported by the administration. Structured curricular time has decreased an average of 20% (Table 9), and pressure on students to study constantly for examinations has been alleviated through the institution of "block" examinations preceded by study time (Table 10).

The development of small group sessions and seminars has been promoted and facilitated in a number of courses, some devoting more than 50% of curricular time to these activities. One major course, Physiology, offers an alternate track consisting almost solely of seminars for the entire course.

Several new multidisciplinary courses have been developed by combining prior courses and eliminating hours considered repetitive (Table 11). These include: Brain and Behavior, combining neurosciences, biological psychiatry, and neurophysiology; Life Cycle, combining growth and development, psychodynamic theories, and

TABLE 4
Comparison of Academic Performance of Early vs Late Admissions to the Classes of 1988 and 1989

	1988		1989	
	Early	Late	Early	Late
Number	78	24	61	48
NBME Part I, mean	515	542	503	469
(SD)	(78)	(78)	(81)	(82)
Clinical honors, mean	1.4	1.5	1.3	1.4

NBME PART I, National Board of Medical Examiners Part I examination.

TABLE 5
Demographics of Class of 1992, MSSM vs Nationwide (Percentages)

	MSSM	Nationwide
Sex		
Women	45	37
Men	55	63
Ethnicity		
White	81	73
Underrepresented minorities	8	9
Others	10	16
Age		
<24	81	69
24–27	15	21
>27	4	12
Humanities majors	10	4
Science majors	67	73

MSSM, Mount Sinai School of Medicine.

TABLE 6
MSSM Early Admission Programs

	No. students accepted at MSSM	Year accepted at MSSM	Year entering MSSM
Humanities in Medicine Brandeis, Williams, Amherst, Princeton, Wesleyan	25	College 1	1
Hunter College Linkage	5	College 3 Post Bacc 1	1
CCNY Biomedical Program	10	College 3	3

MSSM, Mount Sinai School of Medicine.

TABLE 7

The Center for Excellence in Youth Education

Programs	Description
ACADEMIC COLLEGE	
Collegiate Careers in Medicine	• A program for all college and post-baccalaureate students who want to become physicians • Building skills necessary for entrance into medical school • Instruction in basic sciences and language arts • Problem solving • Career counseling • Placements
Undergraduate Summer Science Program—Mount Sinai Graduate School of Biological Sciences	• Special seminar series • Competitive program of summer stipends for students interested in a career in biomedical sciences • Research placements
Humanities in Medicine	• Basic Sciences studies for liberal arts majors from select colleges • Offered Summer
The Hunter College (CUNY) Early Acceptance Program	• For a limited number of undergraduate and post-baccalaureate students • Early acceptance into The Mount Sinai School of Medicine
The Sophie Davis Biomedical Program of City College of City University of New York	• For a limited number of selected students • Early acceptance with advanced standing into the third year of medical school
HIGH SCHOOL	
Careers in Medicine/Mount Sinai Scholars at Manhattan Center for Science and Math • Grades 9–12	• Specifically designed for high school students seeking careers in medicine • Hospital Placement • Instruction • Counseling • Mentors • Oral reports
Allied Health Program • Grades 9–12	• For high school students seeking careers in the medical, laboratory and technical health fields • Conducted in conjunction with New York City Technical College • Hospital placement • Mentors • Oral reports
Undergraduate Summer Science Program	• A seminar series for high school students working in the medical center
Careers in Nursing • Grades 11 and 12	• For high school students seeking to enter the field of nursing • Implemented through The Mount Sinai Medical Center Department of Nursing • Mentors • On-site instruction • Career orientation • Offered year round
Minority Research Apprenticeship • Grades 11 and 12	• A hands-on learning experience in biomedical research • Projects • Oral reports • Summer only
JUNIOR HIGH SCHOOL	
Mount Sinai M.A.S.T.E.R.S. Program • Grades 7 and 8	• For junior high school students interested in careers in science and technology • Science projects • Instruction • Computer application • Oral reports • Offered year round
OTHER	
Volunteer Department • Junior high, high school and college students	• Provides opportunities for students to learn about the fields of medicine and health sciences • Assignments are determined by experience, education, and area of interest • Placements range from assistance in patient care areas to laboratory research • Offered year round
Work/Study	• For students currently enrolled in community-based programs for career development • An opportunity to gain practical experience • Offered year round

human sexuality; and Clinical Examination of the Patient and Critical Assessment, introducing a new instructional component of problem-solving and critical analysis. An entirely new course, Student Well Being, was instituted at the inception of the new curriculum to address the adjustment to medical school and the issues of stress, competitiveness, and impairment, which have become increasingly important in the education of a physician as well as in the practice of medicine.

Interactive computer systems are in the process of being developed. An on-line system for self-testing knowledge in the basic sciences, which cuts across all disciplines, has been in existence for two years. Several courses are exploring existing interactive computer videodisk programs, the most advanced in Pathology.

In order to assist students interested in careers in academic medicine or in finding out more about research, several changes have been made. The Medical Scientist Training Program (MSTP) has been expanded, providing greater flexibility to students who will be obtaining both an MD and a PhD degree. An Honors Research Track was developed in the MD curriculum to allow those students devoting at last four months to full-time research to submit a research thesis and graduate with Distinction in Research.

Evaluation of the Educational Process

It is obviously quite difficult to compare objectively the education of our students with the education of students enrolled in other medical schools. Curricula differ with institutional goals and specific needs of students with respect to residency training. The means of available assessment are notably those relating to performance on National Board Examinations, which compare our students with those in a nationwide pool, and our students' ability to obtain competitive residency training programs, which reflect program directors' feelings concerning undergraduate education. Our standing with respect to these two parameters is as follows.

National Board Examinations. Several years ago, passing the National Board Examinations (NBE) became a requirement for advancement into the third year and for graduation, a requirement existing in 66 (NBE Part I) and 51 (NBE Part II) other medical schools (6). This was done with some trepidation as, in the past, our students' performance on the Part I Examination had always been less than stellar, with a failure rate ranging from 10% to as high as 19% (the nationwide fail rate approximated 11% or 12%).

TABLE 8

MSSM Ad Hoc Committee Planned Curricular Changes, 1986

- Promote decreased reliance on lectures
- Develop interactive computer videodisk programs for self-assessment and independent learning
  - —Provide faculty with space and resources to develop programs
  - —Provide students with sufficient computer terminals
  - —Initiate interactive programs as part of required curriculum
  - —Expand database to include: Old NBME Part I questions, integration with clinical management programs, and integration of NBME Part III prototype computer examination
- Review clinical curriculum
  - —Develop a comprehensive, practical clinical examination to assess student skills learned during third year
  - —Based on information obtained, review clinical clerkships

MSSM, Mount Sinai School of Medicine.

TABLE 9

MSSM Curricular Hours 1976–1988

	1976	1980	1984	1988	% Decrease
First Year					
Total hours	837	880	873	766	13
Duration (weeks)	36	36	36	38	
Hours/week	24	24	24	20	
Lecture hours	445	490	483	404	18
Total (%)	(53)	(56)	(55)	(52)	
Second Year					
Total hours	911	945	879	697	23
Duration (weeks)	36	36	36	36	
Hours/week	25	26	24	19	
Lecture hours	481	649	589	479	26
Total (%)	(52)	(68)	(67)	(69)	

MSSM, Mount Sinai School of Medicine.

TABLE 10

Changes in Curricular Structure, MSSM, 1986–1989

- Resequencing of courses
  - —All basic sciences except pharmacology and organ system pathology in first year
- Decrease in required curricular time in basic sciences by 20%
- Start of first year mid-August rather than after Labor Day
- Establishing examination weeks for "block" examinations with study time beforehand

MSSM, Mount Sinai School of Medicine.

TABLE 11

Changes in Course Offerings at MSSM, 1986–1989

New courses	Deletion
Student Well Being	Neurosciences
Brain and Behavior	Human Behavior
Life Cycle	Human Sexuality
Clinical Examination and Critical Assessment	Legal Issues in Medicine
	Reproduction
Integrated Ethics Curriculum	Human Growth, Development and Senescence

MSSM, Mount Sinai School of Medicine.

TABLE 13

Relationship between NBME Part I Performance at MSSM and Curricular Hours, 1980 vs 1987 & 1988.

	Hours % decrease	Part I NBME scores % increase (decrease)	
		1987	1988
Anatomy	15	0	6
Behavioral science	4	4	7
Biochemistry	17	5	4
Microbiology	23	0	0
Pathology	25	(6)	(6)
Pharmacology	23	5	9
Physiology	22	0	0
Total hours	20		
Total test score		0	4
% Fail		(13)	(6)

MSSM, Mount Sinai School of Medicine.

In June 1988, the first year that this requirement came into effect, the Part I examination was particularly difficult, resulting in a nationwide failure rate of almost 16%. Our students, however, did remarkably well, experiencing the lowest failure rate ever (6%), all but two students passing this examination on their second attempt. These data suggest that with respect to meeting competency objectives, we have more than achieved our goals.

An assessment of the effect that the changes in curricular hours and resequencing of courses have had on the NBE Part I is presented in Tables 12 and 13. Despite the consistent decrease in structured hours, NBE Part I scores have either remained unchanged or have slightly, but not significantly, increased. These findings are similar to those reported by Jones et al, who suggested that schools that have "heavy and intense" preclinical curricula should reexamine such policies (7).

Residency Training. Our students have always done quite well with respect to matching at the residency programs of their choice. Selection of specialties has, in general, paralleled that seen nationwide, with the exception of fewer students entering family practice (Table 14). The most recent comparative data for the Class of 1989 are presented in Table 15. At times the faculty has been concerned that the students were not aiming high enough; however, the students have consistently been quite happy with their selection of programs. In the Class of 1989, 52% of students received their first choice and 86% one of their first three choices at some of the most outstanding programs in the country. Only one student did not match to a first-year program (less than 1%), compared to a nationwide nonmatch rate of 6%. Our success in placing students in highly competitive surgical specialties is not as good as other specialties but is consistent with nationwide trends, because there are approximately one-third more students interested in these fields than available positions. Those students with strong academic records are easily placed; those with less competitive records do not fare as well.

TABLE 12

Relationship between Curricular Hours and NBME Part I Performance at MSSM

	1980		1984		1988	
	Hours	NBME I	Hours	NBME I	Hours	NBME I
Anatomy	278	469	278	455	242	499
Behavioral science	53	454	52	452	50	488
Biochemistry	145	513	145	538	120	532
Microbiology	128	503	121	504	98	504
Pathology	165	498	165	467	126	466
Pharmacology	118	480	110	491	89	523
Physiology	128	465	128	477	100	480
Total test score	1825	482	1752	481	1463	500
% Fail		19		14		6

MSSM, Mount Sinai School of Medicine.

Alumni Practice Patterns

Patterns of practice of our alumni (classes of 1970–1983) are described in Tables 16–18. Not unexpectedly, most of our alumni are immersed in patient care. If one excludes those still in residency or fellowship training, more than 92% are certified in at least one specialty. Surprisingly, only one-third of alumni are located in New York State or New Jersey, despite approximately 70% of students entering the school during these years having New York State residences.

Agenda for the Future

Although the school has traveled a great distance in the last twenty-five years, we still are continuing to evolve and grow. Our attempts to attract as heterogenous a student body as possible will continue. Humanities majors, as well as those interested in basic scientific research, will be welcome. Outreach programs for underrepresented minorities will continue to grow.

The basic science curriculum will continue to evolve consistent with the advances in science relevant to the biology, as well as the practice, of medicine. Computer technology will develop truly interactive programs rather than electronic textbooks, extending through the clinical years to the physician in practice. This will be done not only by our faculty but also by developing consortia with other medical schools with similar interests.

Initiating change in the traditional clinical curriculum will begin to further strengthen students' clinical skills while increasing their exposure to ambulatory medicine. A comprehensive clinical examination with the use of standardized patients will be developed to help students acquire the ability to identify and rectify deficiencies prior to graduating medical school. Included among these will be the faculties of crit-

TABLE 14

Percent Distribution of Specialty Selections, MSSM

	1970 to 1976		1981 to 1985		1989	
Primary Care		50		48		41
Family Practice	3		3		2	
Medicine	35		36		29	
Pediatrics	12		9		10	
Surgical Specialties		14		27		19
General Surgery	3		8		7	
Neurosurgery	<1		1		—	
Ophthalmology	4		5		4	
Orthopaedics	4		5		3	
Otolaryngology	<1		5		2	
Urology	<1		3		3	

MSSM, Mount Sinai School of Medicine.

TABLE 15

Percent Comparison of Specialty Choices, MSSM Class of 1989 vs Nationwide

	MSSM†	Nationwide‡
Family practice	2*	11
Internal medicine	29*	23
Pediatrics	10	9
Obstetrics-gynecology	4*	7
General surgery	7	7
Surgical specialties	12	13
Anesthesiology	14*	6
Emergency medicine	1	3
Pathology	2	2
Psychiatry	9*	6
Physical medicine	2	1
Radiology	5	4
Total no.	126	13215

MSSM, Mount Sinai School of Medicine.

* Highlighted difference.

† Excludes transitional, approximately 5% of pool.

‡ Nationwide data obtained from National Resident Matching Plan data for 1989.

TABLE 16

Specialty Practice & Certification, MSSM Classes 1970–1983

	No. (%)	Certified (%)
Other		
Anesthesiology	47 (4)	(79)
Critical care	11 (<1)	
Dermatology	39 (3)	(71)
Emergency medicine	46 (4)	(46)
Neurology	24 (2)	*
Pathology	16 (1)	(100)
Preventive medicine	11 (1)	(100)
Physical medicine	9 (<1)	
Psychiatry	93 (8)	*
Radiology	66 (6)	(80)
Primary care		
Family practice	50 (4)	(70)
Internal medicine		(100)
General	75 (7)	
Subspecialty	298 (26)	
Pediatrics	131 (12)	(82)
Surgical fields		
General surgery	57 (5)	(52)†
Ophthalmology	51 (5)	(86)
Orthopaedics	48 (4)	(58)†
Otolaryngology	30 (3)	(77)†
Neurosurgery	6 (<1)	(50)†
Urology	21 (2)	(52)†

MSSM, Mount Sinai School of Medicine.

* Psychiatry/neurology 76% certification.

† May not have met time requirements for certification.

ical assessment and interpersonal relations between physician and patient.

Integral to this process, as noted elsewhere in this issue of the *Journal,* is the development of a faculty committed to research, as well as the practice of medicine, and able to make changes, when necessary, to have not only a dynamic, evolving curriculum but also one based on careful evaluation of the process by all concerned.

TABLE 17

Major Professional Activity, MSSM Classes 1973–1980

	No. (%)
Patient care	
Office based	677 (60)
Hospital based	
Attending	128 (11)
Resident/fellow	176 (16)
Full-time teaching	25 (2)
Administration	35 (3)
Research	62 (5)
Not classified	28 (2)

MSSM, Mount Sinai School of Medicine.

TABLE 18

Primary Residence of MSSM Alumni Classes 1970–1983

	No. (%)
New York	459 (35)
California	133 (10)
New Jersey	114 (9)
Massachusetts	78 (6)
Pennsylvania	51 (4)
Florida	50 (4)
Maryland	85 (3)
Connecticut	29 (2)

MSSM, Mount Sinai School of Medicine.

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The Graduate School of Biological Sciences: The First 25 Years

AN INTERVIEW WITH TERRY ANN KRULWICH, PHD

Dr. Krulwich is Dean of the Graduate School of the Mount Sinai School of Medicine. The interview was conducted by Journal *Associate Editor Sherman Kupfer, MD, on May 23, 1989.*

Kupfer: Terry, the Mount Sinai School of Medicine was conceived 25 years ago as a logical and necessary undertaking by the Board of Trustees and staff of The Mount Sinai Hospital. At that time it was perceived that there was a great need to expand the numbers of practicing physicians. In those early discussions, a major emphasis was placed on enhancing the on-campus activities in the basic biomedical sciences as part of the plan. What possible role could the birth of a graduate school for biological sciences, separated from a university campus, perhaps even without a university affiliation, have on the numbers of physicians, and how and where they might practice?

Krulwich: I'm not sure that the birth of the Graduate School and its endeavors within a medical center directly impacts so much on the numbers and where they might practice as on what kind of medicine they are trained to practice and think about. The crux of establishing the graduate school at the time of the birth of the medical school is that the birth of the medical school meant that a basic science faculty was to be established and integrated into an already substantial clinical facility. The clinical faculty was distinguished and quite active in research. The basic science faculty is obviously necessary for the preclinical teaching. It is also part of bringing a hospital into a medical center in which there is a full interaction of very basic research and clinical research, which hopefully meld and work together for research progress, education, and ultimately for patient care.

You can't have a basic science faculty of any distinction unless you have a graduate school. Basic scientists, be they in a university or in a medical school, must have graduate students because these trainees stimulate their research, to a great extent help do the research, and act as bridges to other colleagues and elements within their own institution and outside. So we had to form a graduate school when we founded a medical school in order to develop a distinguished basic science faculty.

Kupfer: In what ways have these goals been fully realized, partially achieved, or set aside?

Krulwich: Beginning with the efforts of the institution's earliest leaders, Mount Sinai's basic science faculty has developed well indeed. The size of the basic science faculty at Mount Sinai has—as elsewhere—depended on the availability of funds, with less growth through the addition of new groups during periods of constraint. Recently, with major credit to Dean Kase, the school has expanded considerably, especially in new interdisciplinary areas and at the very cutting edges of traditional disciplines in biomedical science. Importantly, many of our basic science programs have developed unique strengths. So with respect to the distinction of the basic science faculty, we have realized a great deal of our initial dream. What's more, the institution—the medical school dean and the medical center president—maintain a commitment that should keep that development going.

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What role has the graduate school had in that, and has the graduate school per se realized its dreams? I think the graduate school's growth has followed very substantially, has paralleled, the growth in the basic science faculty. As a graduate school, we have experienced, as others have elsewhere, a faltering of interest in PhD training, followed happily by a bit of a renewal of interest as new molecular sciences entered the scene. We have always been blessed by the ever-growing and intense interest in MD-PhD training. Our graduate school is still too small relative to the internal demand for students from our active research faculty. And so, in that respect, we have not realized our full potential within the institution, but we certainly hope to do so.

Kupfer: One of the things that intrigued me when the school was formed was the concept Hans Popper embraced ("New Objectives in Medical Education," Ann NY Acad Sci 1965; 128:473–479), trying to develop quantitation and objectivity in medicine. As an aside, do you think the graduate school has had any influence in that respect on the training of medical students? Ought medical school education be more graduate-oriented than training-school oriented?

Krulwich: As dean of the graduate school, I will take no position on the "ought."

I think the presence of an active graduate school program, the presence of PhD and MD-PhD trainees, does make a very big difference in the MD program. The medical students at Mount Sinai have for a long time conducted research as part of their training to a greater extent than in many other schools. The labs are very open to them. Our students are encouraged to take advantage of this openness, and in that experience, the medical student is placed in juxtaposition with the longer-term graduate school student in the laboratory in a way that's very beneficial to both of them. That exposure of the medical students is incorporated into their training experience and sensitizes them to the research enterprise.

In addition, with specific respect to quantitation, we do have a kind of unique emphasis and facility here in academic biomathematics and computing, which has been enhanced in part through our relationship to the City University. And that certainly impacts on the entire environment.

Kupfer: Well, I'll come back to that particular point. But in relation to what you said before about the graduate school, are there any new expectations?

Krulwich: Absolutely. Part of this is driven by the massive and to some extent unanticipated changes in biomedical sciences in the last few years. The technologies, the concepts that have opened up because of those technologies, in biophysics, in imaging, in molecular biology, in cell biology and in virtually every area of biomedical sciences, have changed the way we look at what we are doing, what we think we can do, and what we should be doing. All these advances in science have had a major impact on the training of our graduate students. They have also changed the preclinical training of medical students—those who will have to be applying the fruits of certain scientific endeavors, as practitioners, in a very immediate way. These advances have changed our view of curriculum and what should constitute a core of initial studies in our program. The new biotechnologies have also changed our view of the aggressiveness with which we should recruit, since there are now many more job opportunities than there once were in the biomedical sciences.

Quantitative Data and Humane Care

Kupfer: As I said, I come back to the question of objectivity. Do you think a more intense exposure of the medical students to basic biomedical science makes them less humane in their dealing with the clinical problems they will face? Does it focus them more on the laboratory reports than on the integration of that information into their clinical practice? We've heard a lot of complaints that the practice of medicine is becoming less concerned with the patients.

Krulwich: Clearly you will not get this scientist to endorse any fantasied dichotomy between humanism and a penchant for the scientific. Mount Sinai certainly attempts to reinforce the concept and practice of humanistic medicine by our medical students, with an emphasis on ethics and humanitarian programs. We expect and find our graduate students to be no less concerned with such fundamental values. If there is such a risk of a dichotomy between humanism and science, it might be enhanced more by a lack of confidence in, or understanding of, all those tests, their limitations, and how they're actually done. If properly educated, our students will know that we take them seriously, but only just so seriously.

I don't think that basic science training leads a humane entering medical student to become overly or exclusively dependent on the bare quantitative data in laboratory reports. These reports do not substitute for all the other aspects which we expect from a competent, humane physician, and no one appreciates the limits of the data more than the scientists who develop the tests. You know there is no substitute for understanding what you're doing as a means of not revering it too much or inappropriately.

Kupfer: You don't see any conflict, then, between the scientific basis of the practice of medicine, and ethics in the practice of medicine?

Krulwich: Science and ethics should not be in conflict.

Curriculum Changes

Kupfer: Have there been any specific changes in the curriculum of the school? You referred to that just a few minutes ago as a result of the concern for the well-being of the basic biomedical sciences.

Krulwich: In the graduate school we have just made a major change in our curriculum. Our graduate program in biomedical sciences now has grown to ten official subareas: biochemistry, biomathematics (a new one), cell biology and cell anatomy, cell and molecular pathology, human genetics, microbiology, molecular biology (another new one), neurobiology, pharmacology, and physiology and biophysics. Previously, large numbers of our graduate students often took certain graduate courses, but the programs of even our first-year students tended to be distinct from one another. The only universal requirement was one core course in biostatistics and computer methodologies. This has been changed.

We now feel that the common language of biomedical sciences is so substantial that our students should have a year-long experience, on entering, in which that language and some of the fundamental concepts are taught. We have therefore developed and introduced a new core course in cell and molecular biology. This course has been developed by two blue-ribbon committees and will be directed in the initial year by Dr. Jay Unkeless (the cell biology course) and Dr. Robert Lazzarini (the molecular biology course). Both are leading figures within the institution and in the international scientific community. This set of courses will provide our entering students with a wonderful common experience, in which they will acquire a strong basis for their more individualized studies at advanced levels in specific subareas. We're very excited about this. We already have requests from medical students and many faculty members to participate in these courses.

I think the graduate school has impacted on the medical school curriculum as well. For example, medical students and MD-PhD students were the impetus for the development of the advanced biochemistry track, and they have been part of the impetus for the development of certain kinds of teaching methodologies and options, in physiology and biophysics, to name just a few.

In addition, the retention and expansion of substantial medical school elective time in the preclinical years has a lot to do with Mount Sinai's commitment to letting students have some individual time for the development of research projects, special tutorials, journal clubs, and the kinds of activities that are a central part of the graduate training experience.

Kupfer: Is elective time for the medical students designed to satisfy their own personal interest, needs, intellectual curiosity?

Krulwich: Yes. And we have substantial numbers of students in each of the first two years, and occasionally later on as well, signing up for research electives as a major commitment.

Kupfer: Do you think this program has a positive appeal to and effect on the recruitment of medical students and graduate students? Do we recruit students who would not otherwise come to Mount Sinai?

Krulwich: I think we do, and I think that we will and can do more. We have been sending out an initial recruitment package to all medical school applicants for the last number of years, a standardized mailing largely for the MD-PhD program. This will be expanded to include one of our more comprehensive brochures on research activities. I know that when we started mailing even the more limited package, we began to get many more of the medical school applicants dropping down the hall to visit with us and talk about some of the people working in areas of research in which they were interested. So certainly it has enlivened the process. Whether it has actually had an impact on the outcome of MD student admissions, I really can't say. Certainly our program growth and development, and our use of this growth in recruitment, has influenced our MD-PhD applicant pool. This pool has been very strong, and continues to grow stronger.

What a Graduate School Does: Interaction

Kupfer: Well, talking about what a graduate school for biomedical science is, could you define the scope of what a graduate school does?

Krulwich: I like to quote Dr. Irving Schwartz, the founder and first dean of the graduate school. He referred to this degree program as focusing on those sciences that flourish within the environment of a medical center. When I first became aware of his statement I wondered about whether this environment really nurtured certain activities. As I have watched the evolution of basic research here over a couple of decades, I began to agree that there are indeed sciences that flourish within this environment.

There is no question that even those young faculty recruits in the most basic aspects of basic sciences who could as well have taken a job in a university and not in a medical center do, by virtue of their presence here, generally develop interests and thrusts to their work that incorporate the features of the environment. These include sensitivity to clinically interesting problems, sensitivity to problems of biomedical sciences that, if not sooner then later, will have an impact on broader problems in biomedicine. These faculty recruits would not have dreamed of this interface with their clinical colleagues before they got here. Thus molecular biology at Mount Sinai will not be the same as the molecular biology at a university that is not affiliated with a medical center. Not that those in the latter setting won't work on medically related problems; they might well. But here at Mount Sinai and other academic medical centers, the basic scientists will gravitate in those biomedical directions in unanticipated and creative ways as they interact with others in the environment.

Kupfer: They'll have interaction then with their colleagues in the clinical sciences.

Krulwich: The interaction is of varying degrees and of very different kinds. But some palpable, mutual influence is commonplace and important.

Effect of the Graduate School On the University

Kupfer: Well, we've always talked about the impact of the university on the graduate school and on the medical school. I've not heard very much talk about the other way around. Has there been much of an impact of this graduate school, for example, on our university?

Krulwich: This graduate school, as you know, oversees the Biomedical Sciences Doctoral Program that is a City University doctoral program, also oversees the MD-PhD program that integrates that PhD program with our medical school program, and sponsors a lively little summer undergraduate research program. The impact of our activities on the university is certainly hefty. In recent years, especially the last few years, our activities in broader CUNY programs has grown substantially, and it will probably grow further.

Specifically, of course, our students take courses at the City University, and the City University students in other doctoral programs take courses here. Many members of our faculty have taught in other City University Graduate Center courses over the years. Currently, for example, Dr. James Roberts of our Fishberg Neurobiology Center is taking an active role in the neurobiology offerings of the whole university. The chairman in Biomathematical Sciences has been actively involved in plenary discussions with the program leaders in mathematics and computer sciences within the City University. That really is to name just a few.

There are collaborations, interdisciplinary projects, joint projects, probably more than are known to me, because they are actually outside the purview of the graduate school, but interactions that nonetheless might not have occurred but for our formal relationship with the University.

Kupfer: Have we had any contact with our university administration recently, or more recently with respect to how Mount Sinai fits into the City University? There had been talk, for example, of having a second medical school at the City University.

Krulwich: The City University Medical School, which certainly has been established, is something I can't address. I'm neither up to date, nor involved in that whole process. On the other hand, I can certainly comment about our relationship with President Harold Proshansky of the City University Graduate School and University Center and other senior CUNY officials. President Proshansky has been extremely supportive of our endeavors; he has been a real friend. He opened our recent Graduate School Day at Mount Sinai with some very interesting remarks. I hope and trust that we've done as much for him. This being graduation season, we've seen a great deal of Chancellor Joseph Murphy, who is tremendously impressive and also very supportive.

Student Applications and Acceptances

Kupfer: Let's go back to the students. How many make application each year to this program, and how many are enrolled?

Krulwich: Approximately 150 completed PhD applications are received. At least as many as that are partials that we elect not to pursue. During the past few years, a small increase has been seen in the number of PhD applications from domestic students. The largest increase, however, is from highly qualified foreign students, from a large number of countries—the largest number from China. We have had a very positive experience with those students. From the group of at least 150 PhD applicants, about 22 PhD students are matriculated each year. Most recently, somewhat more than that, 22–25, are being matriculated each fall.

There are an additional 130 to 200 applications to the MD-PhD program. We generally admit 6 students into the first-year class and, almost every year, take one additional student into the third year of the MD-PhD program.

Kupfer: How well does the Mount Sinai program compete for the best students? You talked about 150 applications reducing to 25 matriculations; do you get your 25 top-ranked students, or do you have to go down the list?

Krulwich: I've never made 25 offers for 25 places in any program.

For the PhD program, each year is a little different, the variability depending on the training area of interest. It's clear that the overall trend is positive, and in some of our areas of strength, we are a gathering storm, able to attract even higher quality PhD candidates, albeit not yet in the numbers we would like. We're seeing more applicants who apply to us but matriculate at other stellar schools. I'm glad to see them applying—we will never attract them if they don't apply. And we are seeing an increasing number of outstanding applicants who are applying to us because they want to work with specific, often newly recruited, faculty members. We also find ourselves unable to make offers to some highly qualified applicants because we do not have enough positions—that is, fellowships. Still, there are areas of the PhD program with wonderful research activities and too few excellent applicants and matriculants.

With respect to the MD-PhD program, I can count without using anywhere near all my fingers the number of programs that still routinely attract away from us students we accept. I need many more fingers to count the programs from which we routinely tend to attract students. We are seeing the effects of increased visibility, and a tremendous faculty recruitment effort in the basic sciences area. In addition, we are the beneficiaries of a growing group of graduates who are our best representatives. So we're still on a rising curve, and our point on that curve is satisfying.

Size and Critical Mass

Kupfer: Are there any special areas of strength that set this graduate school apart from other schools?

Krulwich: I've alluded to some of them and to do so more specifically is to disserve all the ones I don't mention. We have had traditionally . . .

Kupfer: You love all your children.

Krulwich: Please. Not the maternal metaphor, it's the hazard of being a woman dean.

Kupfer: Do you think the school has reached its optimal size, and is there a critical mass of students?

Krulwich: As I noted before, I think we are still too small. We currently have 140 students. Approximately 40 are MD-PhD students. In terms of simple visibility within the institution, we are just about at a minimal critical mass, because our predoctoral PhD student body is almost as large as one whole medical school class. Once that happens, the aggregate group size is very palpable in interactions with medical students and visible level of activity in the academic community. But in terms of the availability of students for all the highly qualified potential training faculty and for collaborations that you want to have between groups, our graduate school student body needs to be larger.

Kupfer: Is there a problem, do you think, in the available pool of students, or the facilities, or funding?

Krulwich: We certainly have the laboratory facilities and potential training laboratories. I get tremendous pressure from preceptors for graduate students. There are wonderful preceptors who would love to train students, who should be training students, who really don't yet have that opportunity, largely because of the numbers. I've indicated our hope and expectation to enhance recruitment of more and ever more highly qualified students. Still, the applicant pool currently could sustain a substantially larger group without any diminution in quality. The most limiting factor right now is fellowship funding sources.

Typical MD-PhD Programs

Kupfer: I want to return to that in a minute, but in respect to the MD-PhD program, can you describe a typical program for one of these students?

Krulwich: Most of our students enter as first-year students directly from undergraduate school or, in some cases, after a year or two of research, conducted after they've finished their undergraduate work. In addition to the standardized scores and grades and other "paper credentials," our most important criterion for selection, among this highly selected group, is the real commitment to research. We assess this not only from letters of recommendation, but also by intensive interviewing, in which we try to identify those students who have been bitten by the research bug and who really can't envision a career that won't encompass some serious research component.

These new MD-PhD students usually enter in July, some five weeks before medical school classes start, beginning with a research rotation. The selection of this and subsequent rotations is made with the help of an advisory committee. The students begin their studies during that first summer, and almost always complete two years of the preclinical curriculum first. During that period they continue a research rotation elective. This enables them to choose their research laboratory and their subarea of specialization. As noted, they are guided in that process, from day one, by an advisory committee consisting of three faculty members of distinction in the student's apparent area of interest. The membership of this faculty advisory committee is revised as necessary if the student's interests change.

Students also participate during their first two years in a special journal club series that's designed for them. Another program-wide seminar allows MD-PhD students to present their own work to each other and to hear presentations by new faculty members they might not readily encounter during classes.

At the end of the first two years, the MD-PhD students have completed their preclinical work, they have chosen a laboratory, and most of them go on to do what is usually three full years of PhD work. Occasionally a student may want to do a year of clinical work first, and that's permitted, but most then do their PhD work.

Our MD-PhD students have done superb thesis work. Their research accomplishments are a source of great pride. When they are ready to enter their clinical clerkships, a substantial clinical refresher program is provided so they can refresh their skills and be comfortable with the transition. I think that the transition period in our program is a little happier than in some other programs. The students are guided rather closely and offered many different options. The final clinical years culminate in subinternships during which there is much counseling in respect to postgraduate decisions. An occasional student will choose a postdoctoral position in research, usually in an outstanding, cutting-edge laboratory, in the student's area of research interest. Most of our students, as do graduates from other MD-PhD programs, go on to internship and residency programs and then most often, after some additional fellowship work, pursue careers in academic medicine.

Kupfer: Have you had any feedback from the clinical faculty on your MD-PhD students and their performance in the clinical years or even in their internship-residency training?

Krulwich: I get a tremendous amount of feedback. Most of it is extremely positive. Questions have been raised about whether we could make the transitions even more smooth and encourage these superb students to integrate into their clinical clerkships even beyond their current high level.

To this end, a new Clinical Advisory Committee for the program has been established, chaired by Dr. Kurt Hirshhorn, chairman of pediatrics. Each student is matched with a specific advisor from this committee who will work closely with the student. For example, this advice might provide a little balancing, a sort of second opinion, about closure, to the student who's spending a lot of time in the PhD period. This advisor might also help with the transition, in terms of both refreshing clinical skills and how a PhD adjusts to reentering the medical school program not quite a freshman, but not quite a senior either. The Clinical Advisory Committee will also hold special seminars and work with me to suggest to the medical school any desirable elements of flexibility that could enhance the program.

The feedback we generally get during the clinical years, from the preceptors of our young physician-scholars, is already terrific. Many of our students receive honors or awards, and they are elected to the honor society out of proportion to their numbers.

Funding

Kupfer: Now we have to come to the all-important question of funding, for both the MD-PhD and the PhD program. Can you tell us a little bit about this?

Krulwich: Our funding derives from a pastiche of sources. We have, of course, training grants to the institution in support of some of our predoctoral programs. Our MD-PhD program is supported in part by a Medical Scientist Training Grant from the National Institute of General Medical Sciences. Additional training grants that support predoctoral students in neurobiology and human genetics have been obtained by those subareas.

In addition, a number of our students have excelled and won individual fellowships from such programs as the National Science Foundation and the Minority Access to Research Careers program, and from various foundations. Research grants pay for a portion of almost every student's career, during the period that student is working essentially full time in the laboratory. In addition, City University and, particularly, Mount Sinai have made available a generous amount of fellowship money in support of predoctoral students in both the PhD and MD-PhD programs.

Finally, there are specific foundation grants to the institution. We have been very fortunate to have fellowship money from the Bodman Foundation and the Achelis Foundation for both PhD and MD-PhD students, and from the List Foundation and the Rudin Foundation for MD-PhD students.

Kupfer: You still could use more money.

Krulwich: We are, as I said, very grateful for the sources we have. Nonetheless the fellowship sources are limiting. We will continue to need more money to allow growth and provide a sufficient stipend so that a student can live in New York City.

Kupfer: Well, the students are an important ingredient because they do contribute so much to the departments to which they are assigned. But you may want to address this. Do you see these departments as being able to function as well as they do if they didn't have any students? In other words, would this be an important area for the departments themselves to support?

Krulwich: Dr. Kupfer, you are sitting in the graduate school office. During the past five years, a period of intense recruitment of senior and junior faculty, I would guess that there is almost no new would-be recruitee for our faculty who has not sat in the chair in which you are sitting and said, "How many graduate students can I expect? What is the quality of those graduate students? Where will they come from? How will they be funded? Can you assure me that my lab will be enriched by the presence of graduate students? It is a major feature of my decision." Graduate students now are certainly no less crucial, and are probably more crucial than ever, to this academic environment. Departments recognize this; they provide funding through their research grant funds and work with the graduate school to attract more general awards.

Careers and Contributions

Kupfer: What do the PhD and MD-PhD students do after they graduate?

Krulwich: First they throw their caps into the air, and then they move on to work even harder. We are very pleased. Our MD-PhD students, as I indicated, largely go into residency programs. Although we are a relatively new program, those who have graduated have assumed positions in academic medicine, and many of them are already making important contributions to their areas of research. We have graduates on the medical school faculties of the University of Pennsylvania, the University of Minnesota, and the University of Texas Health Center in Dallas, at Mount Sinai, and on the staff of NIH. Our PhD student graduates are pursuing more varied kinds of careers, many either in academia or in industrial settings, a small number doing other things—science writing, science policy. Among the academicians we have PhD graduates on the faculties of the medical schools at New York University, Columbia University, Cornell, McGill, Tuskegee, Rutgers, Harvard, Wayne State, and many other institutions

What would be more interesting, I suppose, would be citing some of their contributions—to the understanding of protein synthesis, to polio virus molecular biology, and the discovery of some new genetic elements in mitochondria. We're really very pleased. Moreover, our alumni in industrial settings are doing equally well. We recently enjoyed, as part of the 25th anniversary celebration, the Graduate School Day in which many of our alumni came back. I was very interested to hear of the activities of our students who are doing research, product development, and monitoring of the development of agents for clinical use, in various pharmaceutical settings. Our alumni are doing very interesting things. What's more, we hear very good things about them. They are sought.

Kupfer: Mount Sinai has been since the days of its founding, and is now, a great center for patient care. How do you see this program as influencing the practice of medicine here at Mount Sinai and perhaps elsewhere?

Krulwich: Clearly the research projects themselves should be mentioned first. The research projects are inspired, initiated, and supervised by the faculty preceptor, but also are the creative offspring of the graduate students who work on the projects. And some of those projects have made important contributions to very clinically related areas.

Second, the graduate students are often the glue between different laboratories that get drawn together in collaboration: an MD-PhD student will end up bringing into collaboration a basic science investigator and a clinical investigator the student has encountered during his or her broader training within the program. Even among our PhD students we see many examples of this, some of them pieces of clinical research with practical, rather close impact on patient care. Graduate students are mobile scholarly entities who tend to bring groups—both clinical and basic sciences groups—into creative interaction. Also, graduate students, MD-PhD and PhD students, are communicating with their peers, their colleagues, and their friends in other institutions.

Kupfer: Do you have any specific advances in mind, in clinical trials, say, or operative procedures, or the pathogenesis of disease?

Krulwich: Students have been involved in such projects as monitoring enzymes that appear to correlate, for example, with activity in sarcoidosis. Other students have worked on the development of pandemic strains of viruses. As you know, the influenza virus is a particular target of research in this institution. There are students who have developed new tests for mutagenesis by environmental agents, and have participated in tests for mutations in a piece of DNA. Students have been involved in the cloning of certain human genes associated with genetic disorders, and in the characterization of RFLPs, the restriction fragment length polymorphisms associated with certain human diseases. These are ones that come to mind immediately but as I cite them I again know that I am leaving out . . .

Kupfer: Others.

Krulwich: Many more than I am recalling.

Kupfer: What opportunities do you see for further growth, if any, and greater impact on the biomedical sciences by the graduate school?

Krulwich: It will happen naturally as we grow because of the way biomedical sciences, at the most basic level, can now impact so quickly on clinical areas. The escalating capability of the biomedical sciences community to successfully approach and begin to resolve problems makes this all happen naturally.

Enhancements in Clinical Services

Kupfer: How do you expect the clinical services to help in this effort, and how might they benefit in recruitment of personnel and the quality of care they offer?

Krulwich: Clinical departments have traditionally, and ever more so recently, been interested in the PhD program because they want to attract to their faculty physician-scientists, physicians with a serious research interest, and physicians with scholarly interest. This interest has grown as the molecular sciences increasingly impinge in very real ways on the practice of clinical medicine. These potential faculty members are no less interested than their basic science counterparts in graduate students, graduate student training, postdoctoral students, and interaction and participation in all the graduate school programs.

Indeed, it is from the clinical faculty more than from the basic science faculty that I've had inquiries about our new core courses and attendance at those courses. On the other side, the activities of the clinical departments in mounting fellowship programs and opportunities for combined research and clinical training create opportunities that enrich the academic environment in a way that helps us tremendously. It especially helps in the recruitment of the very best MD-PhDs.

Kupfer: With respect to the clinical departments' focus on the programs, the 10 programs that you enumerated much earlier: some faculty members in clinical departments relate to these particular programs. Do any of them have any programs for their house staff? Does that group interact with the graduate school?

Krulwich: Many members of clinical departments are formally associated with one or more of the 10 subarea programs. Other, broader efforts that emerged from clinical departments have been formalized into programs funded by training grants. Neurobiology and human genetics have both a pre- and a post-doctoral component; the postdoctoral component very often includes clinical fellows. There is a growing program in endocrinology and a major effort in environmental medicine. Periodically, the graduate school has sent out material to the entire house staff informing them of the larger research activities within the institution. We encourage them, if they wish, to look into opportunities that might be of interest to them, and very often we get takers. A number of successful research endeavors have grown out of this effort.

Kupfer: Is there any idea of developing a post-MD program to encourage people to go back into basic sciences, as they do in some graduate schools?

Krulwich: The graduate school is not planning to develop such a program, in part because we don't need to. Many of our clinical departments have such fellowship programs, in which research is a major component. What the graduate school would like to help with is to put information about all those programs together into a single publication. Thereby, our numerous existing efforts in this arena would be organized in such a way that we can all become aware of it internally. Presumably it would also help in recruiting, but I suspect that external recruitment of fellows by individual clinical interests and departments is quite strong. Although we are not directly in the "business" of post-MD training, we have had several very good post-MD students in the graduate school. Among our PhD graduates this past spring was a graduating surgical resident, an outstanding one, who will go on in the field of transplantation immunity.

Kupfer: What I was specifically thinking about is whether, when house staff are being recruited, the graduate school influences the potential recruitee's choice to come to Mount Sinai to undertake further clinical training.

Krulwich: For those potential house staff officers who have a research inclination or a serious research interest, there is no question that the presence of our activities is a factor. But I think that our clinical faculty members are quite aware of that factor as they, for example, try to recruit graduates of other MD-PhD programs.

Kupfer: Well, thank you very much, Dr. Krulwich. Do you have any other comments you want to make in closing?

Krulwich: I want to thank you for taking the time to talk with me about the graduate school and to express my pleasure for having the opportunity to lead this graduate school in an institution that's been so supportive.

Kupfer: Well, thank you very much.

Surgical Rounds in the Charles A. Wimpheimer Ward for patients with diseases of the stomach. *Photograph by Paul J. Wolf from the Archives of the Mount Sinai Medical Center.*

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The Impact of Molecular Biology on Understanding of the Human Disease Process

ROBERT A. WEINBERG, PH.D.

Adapted from an address on September 26, 1988 at the Mount Sinai School of Medicine Convocation.

We are in the middle of a revolution at present, a revolution that is rapidly changing our view of life and its processes. Barring natural or man-made catastrophe, the face of medicine will be radically different 20, 30, and 40 years from now. To be sure, the electronic revolution will have, and already has had, profound effects on medicine. I need only cite data handling and integration, and diagnostic machinery including x-ray tomography and nuclear imaging. But in the long run, it is molecular biology, or—stated more broadly—the revolution in biology, that will change medicine immeasurably. The effects will come in all areas of medicine—in our understanding of disease process, in diagnosis, and ultimately in therapy.

To begin, what precisely do I mean by the revolution in biology? I refer to our newly gained abilities to trace disease processes, biological states, and biological products back to the workings of specific genes, to isolate such genes in pure form, to characterize these genes in their most minute detail, to redesign the genes according to our own specifications; and, in the end, to reintroduce genes back into organisms, including bacteria, mammalian cells growing in culture, and even whole organisms. Who in 1970 could have imagined what we are able to do in 1988, not to speak of what will come 10 to 20 years from now?

How will these newly gained powers impact upon medicine? First, and in the short run, the greatest impact will be in our understanding of the origins of diseases—the root causes, the etiologies. The great majority of diseases have causes that can be traced ultimately to malfunction at the level of molecules. These breakdowns of our molecular machinery will be revealed to us in precise detail. In the case of diseases that have strong genetic determinants, the genes in question will rapidly come into view. There are more than 2,000 documented human genetic conditions. Many are rare, but the frequently occurring ones, many dozens of them, will be associated with specific genes and specific molecular defects in the coming years.

Among these diseases deriving from inherited susceptibility, some are already well understood at the genetic and molecular, biological level. Indeed, your division of human genetics here at Mount Sinai is one of several foremost in the country in doing just that. Examples of these genes and associated diseases include certain types of atherosclerosis, Tay-Sachs disease, and Duchenne muscular dystrophy, to cite some more recent advances. But these represent only a beginning. On the near horizon loom genes such as those determining Huntington's disease, cystic fibrosis, familial polyposis leading to colon cancer, and indeed a whole cluster of genes predisposing to tumors of various origins—including breast and kidney tumors. The gene for one such tumor—retinoblastoma—is already in hand. Further down the road will come genes affecting the brain, including perhaps genes conferring manic depression and even schizophrenia. We will also uncover genes governing subtle differences in our makeup, including susceptibility to infectious

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agents and carcinogens, and even genes favoring the development of certain types of autoimmune disease.

Following the isolation of these genes, there will follow quickly, in each case, insights into how each is able to work to trigger the disease process. With our current rapid advances in gene mapping and automated DNA sequencing, we will experience a veritable avalanche of newly identified genes in the early and mid 1990s. With each of these discoveries will come abundant new insights—indeed more than we will be able to digest effectively in the short run. In addition to clarifying the molecular basis of hereditary disease, the new biology will also generate rapid conceptual advances in those diseases triggered by infectious and chemical agents. One prominent and familiar historical example: within several years of the initial encounter with a totally novel syndrome—AIDS—its causative agent, the human immunodeficiency virus (HIV), had been isolated and subjected to the most detailed molecular scrutiny. Such rapidity in discovering a disease and tracing its causes to an infectious agent is, of course, totally without precedent.

There are those who believe that a number of the degenerative diseases, including arthritis and diabetes, will soon yield insights into their causation, perhaps also connected with infectious events. Our understanding of the mechanism of senile dementia may not lag far behind. Understanding of somatic genetic diseases—those provoked by damage to genes occurring during one's lifetime—will also come quickly. Indeed, it already has in the field of carcinogenesis. Our understanding of the molecular origins of cancer is light-years ahead of where we stood just a decade ago, and the progress is continuing. I refer here to the discovery of oncogenes and more recently of their partners in crime in the cancer process, the tumor-suppressor genes often called anti-oncogenes. In the coming decade, the growth regulatory circuitry of the cell will be worked out in intricate detail. With that understanding will come the discovery of all the ways this circuitry can be derailed to trigger cancer.

Those like myself, working at this basic level, do so with the faith that such understanding of basic disease-causing processes will be translated ultimately into dramatic innovations in clinical practice. Such faith has already been vindicated in small part in the area of diagnostic techniques, which will be unrecognizable 10 years hence. There will undoubtedly be changes in information processing and computer-aided decision making. But molecular biology will prove to be the most powerful engine driving these changes in diagnosis. In the area of genetic diagnosis, the changes are already happening, and very quickly. For example, the recently discovered polymerase chain reaction—the PCR technique—already makes it possible to detect very subtle genetic lesions in very small numbers of cells with lightning rapidity. Within the next several years, we will have machines that will be able to take small numbers of cells from amniotic fluids or from blood, and generate clear diagnosis of the presence of genetic lesions governing diseases as diverse as Tay-Sachs and sickle-cell anemia. As other genes are isolated, they too will be analyzable through those procedures. We can anticipate a day when automated DNA diagnosis machines will spit out data on the state of hundreds of genes in a person's DNA. In harness with these changes and improvements in genetic diagnosis will come extraordinary increases in our ability to detect infectious agents. We are already close to detecting HIV infection in one out of a million white blood cells.

We haven't even begun to think seriously of the ethical implications of all this. Think of the days, some years hence, when some bright young researcher discovers a gene governing mathematical ability, musicality, depression, or even aggressiveness. Some of this is unsettling, indeed takes on a nightmarish aspect. But much of this will surely come.

And finally, what will we be able to do to affect directly these disease processes? In the end, the greatest changes in morbidity and mortality will undoubtedly come, as they always have in the past, from prevention, not from therapy. Here, molecular biology will make very substantial contributions. In infectious diseases, molecular biology will generate a whole new generation of vaccines—tailor-made and targeted with great precision. The time may even come when HIV infection, like all other viral diseases that afflict us at present, is blocked by a vaccine, in this case perhaps engendered by recombinant DNA.

Our rapidly changing understanding of the etiology of cancer and circulatory disease at the molecular level will yield lifestyle changes and newer agents that compensate for life styles not fully attuned to good health.

And what of therapy? Here I'm less prone to speculation, perhaps uncharacteristically. Here the path will be more tortuous, and my vision is much more clouded. I will say only that here we will see the biggest surprises, and from totally unexpected quarters. This projection is fueled by my faith that by understanding the component parts of disease, we will achieve totally new kinds of cures: new generations of custom-designed chemotherapeutics for a wide variety of diseases. Recombinant insulins, clotting factor VIII and tissue plasminogen activator are only the beginnings of things to come. These and a hundred other novel products will turn medicine on its head. And in so doing, will change the lives of us all.

Medical Rounds in Klingenstein Clinical Center in 1966. On the left: Jeremiah Gelles, now an attending in Internal Medicine and Cardiology at Methodist Hospital, Brooklyn, NY; Harold Mellin; at the foot of the bed, hands on hips, Allen C. Unger, now an attending physician in Cardiology at Mount Sinai. *Photograph by Joe Baker from The Archives of the Mount Sinai Medical Center.*

Dean's Seminar 1

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The Gift of Life: Dilemmas in Organ Transplantation

MODERATOR: ARTHUR L. CAPLAN, PH.D PARTICIPANTS: GEORGE ANNAS, J.D., M.P.H., ROBERT BAZELL, LEWIS BURROWS, M.D., CHARLES MILLER, M.D., AND JUDITH SWAZEY, PH.D.

This seminar was sponsored by The Mount Sinai Auxiliary Board in celebration of the twenty-fifth anniversary of the Mount Sinai School of Medicine and was held on October 26, 1988.

Introduction and Summary

ARTHUR CAPLAN, PH.D.

In one sense publishing the fruits of a discussion among noted experts about the ethical and policy implications of organ transplantation in the United States today needs no rationale or justification. Organ transplantation is intrinsically fascinating. And there is no area of health care more fraught with moral and policy dilemmas than organ transplantation.

The shortage of organs for transplantation is an all too familiar reality. Our newspapers and television news programs are chock full of stories about families desperately searching for a donor of a kidney or bone marrow in the hopes that a transplant will stave off the death of a loved one. The media has made us all familiar with the plight of those with failing hearts or livers who wait by the phone hoping for a telephone call telling them that a cadaver donor has been found.

There are thousands of Americans on waiting lists at various transplant centers around the nation who will die unless they receive a transplant. Public officials and transplant surgeons are faced every day with the problem of how to fairly and equitably ration access to a lifesaving resource. There are few other areas of medicine where life and death decisions are so obvious and so unavoidable.

Ethics and Policy Issues in Transplantation

In fact, there are really four themes that the availability of kidney, heart, lung, liver, and pancreas transplantation raise that motivated the convening of a panel of experts to discuss the topic at the symposium.

Supply: Increase the Supply of Organs? The first theme is, What should be done, if anything, to increase the supply of organs and tissues available for transplantation? Should we allow those who want to, to sell their organs upon their death as a way to increase the supply? Should we be turning more aggressively to animals as a possible source of transplantable organs, as did the surgeons at Loma Linda University Medical Center in California when they tried to use the heart of a baboon to prolong the life of Baby Fae?

Allocation: What Criteria for Choosing Recipients? Even if new sources of organs were found or public policies were modified in such a way that the supply of cadaver organs were in-

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creased, it is very likely that there would be more people who could benefit from a transplant than there would be organs to give them. What criteria should guide the choice of recipients? And who should make decisions on who should live and who should die when not all can hope for a chance at life?

Many people have argued that age should be used as a criterion for granting access to transplants. Those over 55 or 65 would simply be ineligible to receive a transplant. Those who have advanced this view do so in the belief that both medicine and society are better served by using scarce organs to give opportunities at life to the young rather than to merely prolong the lives of the old.

Still others have suggested that decisions about rationing the scarce supply of organs should be based on the ability of a particular patient to benefit from a transplant. If someone smokes, abuses alcohol, or abuses drugs, the chances of a successful transplant are compromised. So these persons should be excluded from the pool of potential recipients.

Cost: Who Should Pay? In the United States today many of the decisions about access to transplantation are made on the basis of ability to pay. Prospective patients who cannot demonstrate an ability to pass the "green screen" test of dollars through having private insurance or some form of government-sponsored insurance such as Medicare or military benefits are often turned away at the door of many transplant centers. Others who might be candidates for a transplant do not even have a doctor or receive regular health care, so their chances of gaining access to a transplant are compromised because they lack access to good primary care.

Transplantation is very expensive. The cost of a liver transplant averages around $100,000 for the surgery and subsequent hospital stay. And when a transplant goes wrong and complications ensue, costs can quickly escalate into hundreds of thousands of dollars. These costs are so high that many insurance companies and health maintenance organizations cannot afford to offer coverage for them. This reinforces the role of money in determining access to transplants in the United States.

Regulation: Who Should Transplant? Problems of supply, allocation, and cost are not the only issues raised by the ability to do transplants. Decisions also have to be made about how many transplant centers should exist, where they should be, and how many operations they should do. It is well known that success in surgery is associated with the regular performance of a large number of the same procedure. Yet some transplant centers in the United States perform only a few transplants, and others perform hundreds. Is there a need to control the number of centers who offer this expensive form of surgery, or would attempts at regulation stifle innovation in a still growing area of health care by driving newer but smaller transplant programs out of business?

Transplantation as a Case Study In Health Care

As this brief statement of the issues makes clear, organizing a discussion of the ethics and policy questions raised by organ transplantation requires no justification. But no one should think that a discussion of transplantation will prove to be of interest only to those who work directly in this field. Every American has a vested interest in transplantation, if for no other reason than that the procedure commands a large amount of public support, in the form of tax monies to subsidize the high costs of transplantation and in the form of requests to the public to donate organs. But this is not the end of the story as to why transplantation is of general interest to anyone concerned about ethics and health policy in the United States now and in the future.

Transplantation stands as a fascinating case study of how Americans cope, and are likely to cope, with the challenge of scarcity throughout the rest of the health care system. Shortages are beginning to appear in many sectors of our health care system, and transplantation can be viewed as an early warning system on how we are likely to respond, in terms of access and equity, to other sorts of shortages—be they scarce beds in intensive care units, or access to rehabilitation programs for those who have suffered strokes or traumatic brain injury.

Reconciling Cost and Medical Need. Transplantation has lessons to teach as well about what constitutes fairness in granting access to high-technology health care. As more and more Americans become convinced that drastic changes must be made in the American health care system, if for no reason other than to contain escalating medical costs, transplantation is a fruitful area to examine the ways in which cost and medical need might be reconciled in our health care system, or to understand the dangers inherent in certain answers, in terms of lives lost and health care needs that go unmet, to the question of attaining control of the costs of care.

Prevention vs Cure. Transplantation raises some hard issues that permeate many areas of health policy that have nothing to do with surgery. Should we place more emphasis on prevention than on acute cures in allocating overall funds for health care? If we can, does it not make more sense to try to teach people not to smoke than to try provide them with a new heart after smoking causes heart or heart-lung failure? But if society places an extraordinary value on freedom of choice and autonomy, is it not unfair to penalize those who make choices in their lifestyle or personal habits which result in harms to their bodies by saying that they cannot get access to medical care that might help them?

Rationing in an American Context. Some commentators say that the American health care system is on a collision course with rationing. That soon all of us will face the prospect of being told by our doctor or by a hospital administrator that our father, our spouse, or our child cannot get medical treatment, not because it does not exist, but because it is not available due to rationing. Many students of the health care system say that in order to prepare for this unavoidable reality we had better pay closer attention to nations such as Great Britain in which rationing is a daily reality of medical practice.

Putting aside the questions of whether rationing is inevitable in the United States and whether it is true that physicians in the United Kingdom really do ration access to life-saving care, the fact remains that organ transplantation provides one area of health care where rationing is not a future prospect but is now a daily reality. Moreover, it is a reality which unfolds against the backdrop of American values, American culture, and American institutions, making transplantation a more likely locus for learning valuable lessons about the future of our health care systems than studying medical practices in other countries with different traditions, social institutions, and values.

Composite Case Studies As the Seminar Process

These are the concerns, some intrinsic to transplantation, some external to it and yet fraught with meaning for the future of the American health care system, which led to the selection of organ transplantation as a useful topic for discussion. The specific format that was used to explore the many issues was to select two case studies involving composite portraits of real patients and real health care teams to make the abstract ethical and policy issues of the world of transplantation concrete. The distinguished panelists whose discussion is presented below were told a little bit about both cases prior to the meeting. But we did not want them to come with prepared speeches or "canned" responses to all of the issues raised in each case. So certain facts were withheld from the panelists, and you are reading their spontaneous reactions to these facts as they evolved during the presentation of each case.

The panelists were also challenged in a different way. At various points in the discussion some of them were asked to assume the identity of someone in the case example. It is useful to see whether the adoption of a particular role or perspective shifts the nature of the ethical analysis that is offered as the conversation about each case unfolds.

Consensus Even If No Answers Are Final

It is sometimes said that no answers are possible in matters of ethics. Each person has his or her sense of right and wrong, good and bad, just and unjust, and all that can happen in a discussion of the ethics of a case is that each person will state their personal beliefs with increasing degrees of certitude. The dialogue presented here shows that ethical relativism is not the only outcome that can result when people of goodwill meet to discuss an issue of deep concern to them. Sometimes consensus emerges, if not over what answers are right, then at least about what answers are wrong. At other times, consensus is achieved as to what the nature of the problem really is, even when disagreement still exists as to the answer that is both desirable and defensible. Both forms of consensus can be found in the dialogue about the cases under discussion.

The discussion about both the cases presented here was vigorous and stimulating. But it was also tolerant and good-humored. The style of discussion has lessons to teach at a time when so many other topics in medicine seem to lead to polarization, friction, and cacophony. Ethics flourishes best when it is rooted in an environment of mutual respect, a state of affairs that the panelists tacitly understood and that is manifest in the style and tone of their insights and their reflections on some of the toughest moral questions of our day.

Composite Case 1

Linda Evans is a two-week-old infant who is suffering from a fatal defect of the heart. She is the first child of a 21-year-old woman, Judy, who lives near Los Angeles. The woman has recently separated from her husband because of his drinking.

Linda was born at a small community hospital. The hospital immediately requested she be transferred to a large teaching hospital in the area which is known for its pediatric surgery department. Linda was transferred.

The physicians who saw Linda told her mother she could not live with the defect in her heart. They said her only options for life were a corrective surgical procedure known as the Norwood operation, performed only at a few hospitals on the East Coast, or a transplant. But they said the chance of a transplant being performed was small, since there were few infants or children who were heart donors.

Judy was despondent when she heard the prognosis and her options: "I want my baby to live—she's all I've got."

Caplan: I think, without further ado, what I will do is take off my teaching hat, put on my moderator's hat, and remind our panel about the case of Linda Evans, the first case we're going to talk about, using a kind of dialectical method to highlight some of the moral, legal, and policy questions in transplantation today. The panel has read the case report—that is, they know a little bit about the case, but they don't really know where we're going with it. I'll be acting as a kind of gadfly and a facilitator to let the panel exhibit their thoughts to you.

Clearly what little Linda Evans has is hyperplastic left heart syndrome. She's got a defect of the business end of her heart that pumps the blood, and unless someone fixes that, and does something about the aorta, which carries the blood out of her heart, she's just not going to have enough blood volume pumping out of her heart to keep her alive.

Her mom is despondent and wants something done to save her infant's life. One option is the Norwood operation, but the doctors say the chance of that working is very low. The only other option is a heart transplant. The doctors were honest and open about it, saying that the chance of a transplant being performed was small because few infants or children are heart donors.

A Pig Heart?

One of the surgeons on the medical team who has spoken with Judy points out that it might be possible—it has been tried in the past—to think about the option of using an animal source. It turns out, in fact, that this particular surgeon has been keeping a colony of miniature swine—pigs. And he's been breeding them for some time; and, you know, he's been reading reports in newspapers in England that it might be possible to use pigs as a source of hearts for either children or adults. According to one British surgeon, a pig is nothing more than a man stretched horizontal. That's a 1980s version of what a pig is.

The surgeon on Linda Evans' medical team is excited by the prospect; he's got his breeding colony going. He sidles up to Judy Evans and says, "You know your daughter is going to die, there's no doubt about that, no doubt at all. No one in the United States has done this operation, using a pig as a source of an organ for a young child. But I'm willing to try it."

Dr. Burrows, Judy Evans is going to come to you next because you've been her contact at this hospital. She has just gotten this interesting announcement from the man who breeds pigs; and you've known about the breeding project for some time, but you didn't know he was going to approach Mrs. Evans about it. What do you want to tell her about trying the procedure?

Burrows: I would try to dissuade her from the use of a pig heart because, number one, it's too experimental; number two, the surgeons there never tried it before; and number three, the modern history of xenotransplantation, of grafts from foreign species, with our present ability to immunosuppress recipients, has been rather bleak. We can achieve only a degree of finite success with animal hearts and other animal organs. But long-term or permanent success has been elusive. I think there are other options, one of them being, obviously, the Norwood procedure, which is a time-buyer. Or a neonatal heart, which will open up a bag of worms—that's what you wanted us to do. But there are other options.

Caplan: I'll supply you with the bag of worms.

Burrows: I would try to dissuade her from the animal heart. I think that's too experimental; and I think she's being selected for this experiment primarily because she is desperate and has no alternatives—that's not ethical.

Caplan: Dr. Miller, I'm Judy Evans. I went in to see Dr. Burrows. And my little girl is dying. He tells me there are options. I go to the neonatal ICU and they say there are no options—she's dying. Maybe we're going to find a human donor, but they've told me that the chance of that is almost nothing. One nurse told me the longer we wait, the less likely it is she's going to survive any kind of transplant. There is this possibility of a pig transplant. My daughter—she's all I have. What is your reaction to the proposal?

Miller: Well, first of all I'm not sure what the definition of "too experimental" is. I would first ask her what she was told was the chance of success.

Caplan as Mrs. Evans: Well, he didn't promise me anything, Doc. He just said the other option is death for my daughter.

Miller: Xenotransplantation, cross-species transplantation, holds great promise in the future, and when the future starts is never clear. So I wouldn't try to dissuade her from it. I think great things can be made out of desperate situations. And if this surgeon who is going to perform this transplant was a little more than a swine breeder, maybe in fact a scientist who had studied xenotransplantation and understood the degree of immunosuppression needed to overcome its violent reactions, I think I might even try to persuade her to go for it.

Caplan: Well, Dr. Swazey, it's all over the hospital now that our friend at the pig farm has made this offer. Everybody is gossiping about it. Turns out that for a long time, at nearby Los Angeles Tech, you've been a member of the human experimentation or institutional review board, of its IRB. Actually, you are now, just by chance, having lunch with our good doctor friend, the man who wants very much to proceed with the pig transplant. What do you want to say to him?

Swazey: I would want to say to him and to the mother that the case, as you've presented it, involves no prior cross-species animal trials. Also, I judge that there has been no application to the institution's IRB. There are very good ethical and legal reasons for the existence of these IRBs, and some of those reasons are illustrated by this case, which certainly should be scrutinized by an IRB. The story as you've sketched it strikes me as an opportunistic attempt to get permission for a dubious experiment—a highly experimental, risky, untested procedure—from the desperate parent of a dying infant. Having watched transplantation and artificial organs very closely for 25 years, I think there are worse things than death, and I think ill-considered human experimentation is one of them. I would strongly recommend against the xenograft.

Caplan: Bob Bazell, you just got a promotion in life. You're the hospital administrator. It turns out that Judy Swazey has come to you and says there's something very strange going on here. There is a doctor running around . . .

Swazey: You're making me a whistleblower again.

Caplan: . . . offering a procedure that's not been approved by our institutional review committee. It is a desperate situation. She's heard from some of the other doctors that this might be something worth pursuing. But what are we going to do about this guy? How should we respond to the fact that this has happened? Should we try to make sure he doesn't get to see Mrs. Evans any more? Should we simply leave it up to her to decide how she wants to proceed? What is our policy going to be, given the way this affair is unfolding?

Bazell: As hospital administrator, I would put this guy in chains, ropes, or any other restraining device I could find and keep him away from the woman because he has not brought the proposed experiment before an institutional review board. I would worry that it would destroy my institution's ability to continue to function in the community if this procedure were to go ahead. And under these circumstances, I would try to put a stop to it as quickly as possible.

Caplan: Well, George Annas, I'm coming to you now as Mrs. Evans. I want your legal help. You know what's going on in this hospital, they're conspiring to keep my little girl from the only option she's got. She's dying, and all of a sudden I'm listening to lectures about ethics committees and approval processes. I don't care about the approval process. I don't care about ethics committees. I want to save my daughter. There's a guy who's got something that might work. It's better than the other option. Time is running out. Will you help me out in trying to do something with this hospital administrator and these other bureaucrats—these petty-minded people?

Annas: What I'd say to you is this: if you really decided you wanted either the infant transplant or the pig transplant, the law is not going to help you very much. But if you're prepared to go to the media and get your case on television, that can turn the administrator around.

Caplan as Mrs. Evans: Funny you should say that, because I did have it in mind to go to the media.

Let's go to the media—to Bob Bazell—his career is improving or getting destroyed again. But he's back now in a media capacity. In fact, he's a local TV personality on the news. I watch him every night. Judy Evans sees him a lot. He's always coming on saying he cares about children. He's big on the community—he fights for it, he wants to improve it—that's what the promotional ads say. I'm going to call him up and say, Look, there's a scandal going on here, something you might be able to help me with. First, would you help me try to find a donor for my daughter, who's dying? I'm interested in finding a donor, and nothing is happening here. Will you help?

Bazell: I'm going to answer that question two ways. I'm going to answer it in the guise of the person you described—who's not me—who may or may not do a story about how compelling Judy Evans' plight to save her child is. That could happen. It would depend on how many similar stories I had done that month or that year in that community, and whether the perception of my news director is that we have overdone that and they are tired of it.

Caplan: So that if I'm the fifth desperate soul of the month, I'm not going to fare as well as if I were the first.

Bazell: Absolutely. If you're the fifth desperate soul of the month and this story has been around before, particularly if your hypothetical tertiary-care facility has seen a lot of these, it may be a well-worn path. And then I'd have to say I'm sorry, I just cannot help you.

Caplan: You can change your hat, becoming the network correspondent who hears about this.

Bazell: I would be on it like a blanket. It would be utterly fascinating and I'd want to do it as much as possible, and I might well tell Mrs. Evans that I'd be helping her out. But what I'd really want to be doing is a story about a guy who's trying to sell a pig heart—an operation without institutional review.

Caplan: That's an interesting story. I suggest to the audience that we watch and see during the next year or two if it's entirely a fantasy story!

Bazell: The BBC has done the preliminary interviews already without any there.

Burrows: That brings up an issue you didn't allude to. I'm questioning whether the press should ever be the watchdog of the medical world or the transplant world.

Caplan: That's funny, Dr. Burrows, because we're going to actually tell you that we've been to the press, and they are quite willing to be our watchdog. They're going to help me. I've got this local story that they're ready to run. And you were kind of down on this, and you are part of the problem.

You are going to be in this story whether you agree to an interview, or whether I talk about you as an obstacle to my hope. And I just want to know if you want to change your mind before we go out there on the local Live at Five TV program and tell them what a slug you are for killing my daughter.

Burrows: Dr. Caplan, I'll rise or fall with my personal beliefs.

Caplan: You'll take your chances.

All right, let's presume that our man with the pig has backed off; that some of the people inside the hospital have gotten to him. He's decided this isn't the time to do it, or the way to do it. He will think about bringing it to the IRB, the Institutional Review Board. He suddenly has a change of heart. He's going to withdraw his offer of participation, leaving Mrs. Evans very despondent.

An Anencephalic's Heart?

But something else has happened now, and this will take us to a discussion of another source of organs that's been widely discussed.

It turns out that not too far away is a woman who has given birth to a baby with anencephaly. This baby was born with about 95% of its brain missing. It simply has a cerebellum, which allows the child's heart to beat, its lungs to breathe, and some basic core reflexes to function. The mother has seen this local story. She knows about the pig option. She knows the doctor has withdrawn it. She's told, at this local hospital, that her baby is going to die; that the condition of anencephaly is fatal. There's nothing to be done. And she wants to know, Can she donate organs from this child?

In fact, we get a question coming now from that hospital, where this baby is, to Dr. Miller—

since he was sympathetic to the pig option in the first place. What about this: Can we use organs—a heart—from this baby? Dr. Miller, this woman has indicated a real desire to have something good come out of her tragedy. She's seen the story. She knows what's going on. Is there some way we could arrange it so we might get an organ donation from this child?

Miller: Are you asking whether we can use anencephalics as donors? I would say yes, because anencephalics have been used. The problem is that they don't meet all the criteria for brain death. But for all practical intents and purposes, they really are brain dead.

Caplan: So you're going to tell her to send this child with anencephaly over here. Deliver the baby here, we'll be ready to go. Your colleague, Dr. Burrows, wants to give you some advice—he doesn't trust you. He's been sitting in your office ever since you've been encouraging the pig option. What do you want to tell him, Dr. Burrows?

Burrows: Well, we discussed this before. The issue is whether you have to wait for the anencephalic to truly die. To keep such a child as an organ farm awaiting a recipient is unethical. In other words, you're keeping that child alive specifically to kill him or her, or to let the infant die at the opportune time. That's not right. The timing has to be in favor in the anencephalic child.

Caplan: You're saying the only way to use that child, born as it is with a heartbeat and functioning lungs, is to put it on some kind of life support to make sure the organs are preserved in order to donate them? You wouldn't want that kind of procedure done?

Burrows: Well, the way they're doing it in institutions in this country is to test them every few weeks to make sure they're going to die if they are taken off the life support. But that is unethical. You're keeping it alive for only one reason—not for the anencephalic child's own sake, but for the sake of being a donor. And we shouldn't do things that way.

Miller: We're really splitting hairs over a very important problem. The only reason you're keeping cadaver donors alive on ventilators is for donation. It's certainly not for their benefit. And is anencephaly really life as we know it—a thinking, feeling individual? Clearly not.

Caplan: George, you are the hospital attorney. Dr. Miller would like to accept this donor. He knows Mrs. Evans is in trouble. Her daughter is really in trouble. And he has had this phone call about the offer of the donor. He's listened to Dr. Burrows' comments about not wanting to treat the anencephalic as an object or a thing, and not wanting to extend its dying. But he needs a little advice here. Should he get involved with this offer?

Annas: He may or may not want to. And I'm certainly not the kind of hospital lawyer that's going to make his decisions for him. But I'll make them easier for him to make. I can certainly give him the law on this, because there is law on this question: The law is that before someone can be used as an organ donor in this country, in every state, they have to be *dead*. And the question I would ask him is, Is there a way to get this anencephalic child to be dead without damaging the organs, and without inflicting any pain or suffering on the child? If he thinks there is a way to do that, we can talk some more.

Caplan: Judy, it's not time yet for the IRB on this one. This is an odd situation where they're thinking about using an anencephalic infant as a possible organ donor. And their lawyers, and the surgeons in the referring hospital, are all clearly wrangling about the hows, and the wherefores. Maybe they can pull it off. Maybe they can do this in a way that seems respectful of the donor's dignity, and without prolonging the suffering of the parents by prolonging the dying of the infant; and so on. But put yourself in the role of someone who's on the ethics committee or an ombudsman. What do you want Mrs. Evans to be told, in terms of informed consent about what has happened here with respect to pediatric transplants? We know she's gung ho; she's said many times she wants to save her daughter's life. What do you want to make sure that she understands in terms of her consent at this point?

Swazey: I want to tell Mrs. Evans she needs to understand what the long-range prospects will be if the infant survives the immediate transplant procedure, in terms of the immunosuppressive drug regimen, the home care the infant is going to have to receive, the effects of Mrs. Evans' recent divorce and home situation, and so on. The home situation was important in the Baby Fae case at Loma Linda, with questions as to whether the young parents could care for Baby Fae if she made it home. I think in this day and age, Mrs. Evans is going to have to be told what the long-term care costs are going to be: for example, cyclosporine is not a cheap drug to take year in and year out. So I think a whole range of issues have to be aired—physical care, psychosocial questions, economics, and possible retransplantation needs as the infant grows, since that very small donor heart may or may not grow apace with the infant. There is a lot the mother needs to be told, and it's a truly difficult time to get informed consent from a mother under those circumstances.

Caplan: Do you think she can hear the information? Do you think she can hear it and understand it?

Swazey: I think she can hear it if it's done well. I don't think it has to be all spat out in one bolus of technical jargon. The procedure is clearly not going to be done in the next hour or the next few hours. We tend to underestimate the capacity of adults, of families, to absorb and process information for their children or for themselves, even when they are under great stress. In the real world, informed consent may not meet our abstract ethical ideals, but I think there are indications that an informed-consent transaction took place in the Baby Fae case, much as we may have a lot of problems with that experiment.

Composite Case 2

John Jones is a 55-year-old man with renal failure. He is divorced and has two children in their twenties from that marriage. He currently is living with his girlfriend in a small town outside a large urban area. He worked as a carpenter and general handyman up until the time his kidneys failed.

Mr. Jones does not know why his kidneys failed. He says the doctors "were never able to figure it out." When his kidneys failed, about a year ago, he began hemodialysis treatment at a local hospital.

Mr. Jones hated dialysis. He said he would have preferred to die rather than to go on "living like that." However, Mr. Jones was lucky. A perfectly matched kidney became available, and he received a transplant after only three months of dialysis.

But Mr. Jones was disappointed by the quality of life he had with his transplant. He felt that he could not go back to his former job: "I just can't lift heavy things and move around the way I need to." He did not like the weight gain he underwent after his transplant. Nor did he feel that he had as much energy as he once did.

Mr. Jones has come to the hospital because he has suffered a bout of rejection with his new kidney. A routine blood test reveals that Mr. Jones has stopped taking his immunosuppressive drugs. When confronted about this he admits it is true. He decided to do so since they were "costing me $380 a month and I do not have that kind of money." He did not discuss this decision with anyone. His doctors believe his kidney has been irreparably damaged as a result of the suspension of his drugs.

Burrows: I'll take my chances with the transplant kidney without the drugs and see if it works or doesn't work. I think it's a very complicated scenario from the patient's perspective. I think the patient should have that option. The patient who doesn't want to go on with dialysis is, I think, often erroneously defined as suicidal, and earns disapproval from members of dialysis units.

Let me go back to a point you raised with the first case, Arthur—whether people have a perception that if you simply put an organ in they can leave the operating room and everything will be fine. I think that misperception is common because I think a lot of units are still woefully inadequate in educating patients to be either dialysis or transplant recipients. I think part of the misperception comes from the public image of transplantation—not from the Bob Bazells and their reportage, but as a consequence of the desperate efforts to recruit more organ donors and the attendant "give an organ, make a miracle" publicity. Transplantation can be rather miraculous, but it is seldom simple and uncomplicated. I think that is the down side of the publicity for organ procurement.

A Second Transplant for a Noncompliant Patient?

Caplan: Dr. Bazell, John Jones has said, "I'm not going to go back on that damned dialysis. That's it, forget it. But Dr. Bazell, I would like to get another kidney." Are you going to ask him whether he is going to promise to take his medicines in the future; are you going to require other promises; or are you going to list him now to be eligible for another transplant, just like anyone else who would be in the pool?

Bazell: No, I would certainly defer to my senior colleague, Dr. Burrows, and would definitely not do anything without his permission in this case. But more to the point, whatever the problem is, and you can define it any of the ways that have been defined so articulately here, it is still a problem and it is not going to go away. If he doesn't take the cyclosporine when he gets a second kidney, it ain't going to work and somebody else who needs that kidney isn't going to get it. That is it, that is all. I cannot see another way out of it.

Caplan: Dr. Miller, you too are sitting around on this very busy transplant service with all these distinguished surgeons, social workers, and coordinators discussing what to do with Mr. Jones. And he has now stated that he basically isn't sure what he thinks. He agrees with something he heard Judy Swazey say once at a public meeting he attended, that transplant isn't what it's cracked up to be. And he can tell you from his own experience that is true. He cannot tell you whether he is going to take his drugs the next time. He's been through it once, he doesn't want to die, but he is not willing to say what his behavior is going to be down the road. He will see as things evolve. You want to put him on the list, and you want to put him on with a higher or lower priority relative to his, let's say, past record with respect to his taking of his medication?

Miller: I think he is the perfect candidate for dialysis. Really, I look at him and then I look at my waiting list of 300 people waiting for exactly the same kidney who show up for dialysis every three days, and cannot wait to be freed from it. I say no.

Caplan: That brings us to Dr. Annas, but a fact has changed in this case. We have got a difference of opinion about Mr. Jones. Some people are saying he just ought not to get on that list at all if he is not willing to commit himself to being a good patient. Someone said, What makes you think he is going to take his drugs now if he really can't afford the money? He will not be better off tomorrow than he was yesterday; that should count against him. And he has already had his shot. What do you think? Should we build the psychosocial and economic factors into our thinking about his suitability for a second transplant?

Annas: I think it makes sense for us to have explicit criteria. I do not think we can say, at least not when the John Joneses come back after the first transplant, "Oh gee, well there was a rule that if you didn't take your cyclosporine, you were never going to be eligible for another transplant again." On the other hand, I think we can set up some rules in advance that are like that. Certainly if the numbers you gave, 12,000 people waiting for kidneys, are anywhere near correct, it may be time to say, "You have the right to one kidney if a match comes up, and that is it. After that, you live on dialysis if your body rejects the kidney." This would certainly be true of liver transplants, even though there are centers that do two and three liver transplants per person.

But this is a decision I wouldn't want the individual physicians to make. I think this should be a societal decision, since we do expect to recruit organs from everybody in society. So I think this issue is one I would like to see publicly debated and discussed. My hunch is—although I haven't seen a survey on this—that we can get some reasonable agreement in society; that with the organ shortage we have, each person gets one organ, and that is it.

Caplan: Dr. Burrows, you have been in this field for a long time; what do you think? You have seen John Joneses come and go. Do you want to go with the position that perhaps once is enough?

Burrows: Obviously once is not enough, because we don't always practice selection that way. I guess it boils down to what the reason for the first failure was. And, with apologies to my cospeaker on the left, if noncompliance was the reason, that is a few points against the recipient. If he lost it because he rejected it—and we will leave out the scientific aspect of this—we may owe it to him to find him a second kidney. Now, in the kidney business, because we are no longer . . .

Caplan: By the way, one more question on this business, because I'm interested in your view of one other fact about John Jones: We have to find him a second kidney, but he is 55. Are you going to try as hard?

Burrows: Yes, that is a wonderful age. It gets better every day.

Caplan: There is an old joke that the average age of those deemed eligible for dialysis has gone up in direct proportion to the average age of nephrologists. Do you care about age at all? He is 55.

Burrows: We are in a different business from the heart and liver transplanters. As of 1988, they are still life-savers. We kidney transplanters are quality-of-life savers. Our kidney patients have alternatives, alternatives which are reasonable. Kidney transplant probably offers dialysis patients the best chance at improving their quality of life. Those patients do reasonably well, and most of them are reasonably happy with the understanding that it is not quite the same as having your two normal kidneys, and being a completely normal person. We have alternatives; maybe John Jones can go back on dialysis. I do not trust this man yet. I want proof that he is going to behave himself.

Caplan: How about if he comes in and gets his blood tested once a week, signs a little agreement that says, Okay, you can check me.

Burrows: Once a week is not enough. You've got to test him every day.

Caplan: I'm not prepared to test him every day. You want to make it once a day and keep him nearby—like probation.

Burrows: I would rather take someone who is desperate for that transplant and will comply with the regimen we place him on.

But if he proves to be compliant on dialysis and he comes back and again asks for a transplant, and if social worker Jane Lowe, for example, tells me it is the thing to do, that he has definitely reformed, I will go ahead and put him on the list, no question about it. That is why we have psychiatric social workers and psychiatrists for our unit. They are going to make that assessment, along with the nephrologists.

Annas: I will join my colleague Dr. Swazey here with emphasis on the term "compliant." The idea is that if he comes back and asks nice, if he does exactly what the doctor wants him to do, then maybe the doctor will consider putting him on the list. That is incredibly paternalistic, even to me, who believes that we should be very tough in allocating organs. But I do not think I want to allocate organs on the basis of how surgeons personally feel about how compliant their potential patients are, and how nice they treat the surgeon.

Swazey: Let me side with Dr. Burrows against my friend George Annas on this, which will probably be a shock to George. I think Dr. Burrows is making a very reasonable statement, because if indeed this patient would prefer not to live rather than to live as a dialysis or transplant patient, he can accomplish that fairly easily if he is put back on dialysis. It is rather easy not to show up for dialysis and to go into a uremic coma.

Miller: Would you put him back on the list if he told you he wanted to try it with no immunosuppression?

Swazey: Would I? No.

Caplan: Let's give the audience a chance with one final question: I am a dialysis nurse and they have sent John Jones over to me; and I ask him, Why? He says, "They are testing me. That is why I am here. I do not want to be here, they are just testing me." I am a little surprised to hear that—What do you mean, they are just testing you? "They want to see how well I do on this, then maybe I can get back on the other list, that is what Dr. Burrows said. If I do good here, then maybe my sin will be forgiven."

How is that going to play when I call up my old friend Bob Bazell at the network? Here is the story, Bob. You know what they are doing, the doctors are having a kind of morality test at the dialysis unit now. People who are real good, the way I understand it, can get back on the transplant list. The ones who do not play ball are out in the cold.

Bazell: I think what would happen is that I would call Dr. Burrows and he would talk to me rather reluctantly because he does not seem to like reporters very much. The conversation would accomplish my desire to have nothing to do with this man anymore. I would not touch this story with a ten-foot pole.

Question: I was a resident in this hospital and on staff here until recently. I'm a practicing radiologist. I look at the age of the people on the panel and I don't think any of them remembers the days when hospitals did routine work free of charge. Doctors did that also. Therefore, I was a little bit shocked when I heard that health care is different. It's not different. What I thought I heard Dr. Miller saying was yes, he would treat the patient free of charge. Because as a practicing physician myself, I never turned a patient away who could not pay. And I don't think that has changed. I think you can always give freely. None of us starves. This is not regular dollars and cents. This is something that a doctor really ought to be willing to do in any given case. I feel very strongly about it.

Caplan: I'm always loathe to end on a note of moral idealism. But it might be an appropriate place to end our deliberations here.

I simply want to thank our panelists, Charles Miller, Bob Bazell, Judy Swazey, Lewis Burrows, George Annas, both for being provocative and for allowing us to see some of the values and principles that underlie and undergird their thinking in struggling with the challenges posed by transplantation.

I thank all of you, panelists and audience, for being with us.

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The Quest for Quality Health Care: Whose Choice? Whose Responsibility?

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Prologue and Summation

AVEDIS DONABEDIAN

On an afternoon in late November, three men and a woman appeared, as a panel, before a distinguished audience of friends and colleagues to offer their views of issues stemming from the "quest for quality health care." The place: the Mount Sinai Medical Center. The occasion: the celebrations in honor of the medical school's twenty-fifth anniversary.

I was privileged to be appointed moderator to that panel. But what you shall hear, first in this introduction, and then in the transcript to follow, are their voices, not mine. It is their knowledge and experience that I wished to tap. It is their insights and wisdom that I would like you to delight in.

In this introduction I hope to convey only a general sense of what was said, without identifying the separate speakers. Nor will I be able to offer a consensus, for none was achieved, or even sought. What emerges, rather, is a mosaic of views, not uniform, but also not discordant. We can see, I believe, a reasonably clear portrayal of both our weaknesses and strengths; of what we have to change, and of what we have to resist changing.

The panelists had agreed in advance to deal with four questions, in a progression, as follows:

1. What is quality? Can we recognize it, or recognize its opposite? Can we measure it?
2. Do we now have care of good quality? What deficiencies are there and why do they occur?
3. How do we go about obtaining care of higher quality? Who is responsible, for what?
4. Can we afford quality care? How much can we afford, and for whom?

Because the members of the panel, in the main, observed this progression, it will be easy for me to summarize their views under the corresponding headings.

What Is Quality?

In attempting to organize their thinking about the meaning of quality itself, members of the panel used two formulations in conjunction. One was to distinguish two elements in medical care, technical and interpersonal, and to specify the desirable properties of each. The other was to distinguish three ways in which the presence of quality could be demonstrated or inferred: appro-

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priate "structure," meaning the way in which health care programs and institutions are set up and run; appropriate "process," meaning how the care itself is conducted; and appropriate "outcome," meaning the improvements in health, well-being, and satisfaction that patients experience.

With regard to the technical component of care, we need to conform to the standards of good practice. With regard to the interpersonal component, the caring function, we need to be compassionate and humane; to be sensitive to the patients' expectations and interests; to take time, to listen, to explain. And everything we do should be conducive to the best outcomes, as the patient values these outcomes.

It can be inferred from the panel's discussions that quality is composed of many dimensions, and that its assessment requires an artful balancing of the subjective and the objective. The standards of good practice, though contingent on the current state of medical science, are often clear enough; but only patients can say what they inwardly feel and value. Outcomes can be measured objectively by calibrating physical or chemical properties of the organism, or its physiological function. With equal objectivity we can measure death or the years of survival, but the quality of life consists of some elements that are fully objective, others that are fully subjective, and still others (for example functional status) that are an amalgam of the objective and subjective.

Subjectivity in the definition of quality seems to stem from two sources: feelings and values. Patient preferences should guide us in arriving at the best balance of the costs and benefits that each, individually, experiences. Social preferences determine the most equitable distribution of care, having regard to the interests of the population as a whole.

Objectivity in the definition of quality seems to stem from two sources as well: the sciences of health care and amenability to quantitative measurement. Even feelings and preferences may be subject to methods of measurement that could permit us to deal with them in a systematic, if not fully objective, way.

Do We Now Have Care of Good Quality?

The members of the panel looked for an answer to the degree of quality in our system in two ways: by examining first the amount and distribution of access to care and, second, the quality of care once access has occurred.

Access, it was clear, failed to meet expectations. It was judged to be deficient among the very young and very old, rural populations, and the residents of the inner city. Many were uninsured, and even some of the insured failed to make adequate use of available resources.

The evidence concerning quality subsequent to access having occurred, appeared more difficult to marshal, but there was no disagreement with the view that we suffer, at the same time, from overuse in some instances and underuse in others; that appropriate services are often improperly carried out; that follow-up and continuity are often defective; that the personal relationship between client and physician is often unsatisfactory; and that physicians impaired by alcohol or other drugs continue to pose a problem.

Meanwhile, our system of health care was judged to be undergoing changes that could influence quality either for better or for worse. Among these developments were the formal organization of the modes of delivering care, the prevalence of for-profit enterprise, and changes in the way physicians and hospitals are paid. In each of these there appeared to be a danger to access, or quality, or both. Yet, each also offered opportunities for improving access and quality. The future appeared beset by peril, but also full of hope.

How Can We Obtain Care of Higher Quality?

It is not surprising that members of the panel recognized the need for action on a wide front in order to improve the quality of care. The health care professions, individual practitioners, institutions, individual patients, organized consumer groups, third-party payers, and government all have a role to play.

The health care professions need to conduct research so as to advance the science of health care. They are also responsible for the proper education, training, certification, and recertification of individual practitioners. It was thought particularly important for practitioners to acquire interpersonal skills, including the ability to counsel and educate patients. But it was not certain whether these skills could be best attained by attention being paid to them in existing courses, or whether new courses had to be designed expressly for the purpose.

Consumers, it was recognized, could mightily influence quality, but they needed to be better informed and empowered to act more decisively in pursuing their own interests. As patients, they could be more prudent in seeking medical attention, more assertive in expressing their preferences, and more actively participant in their own care. By becoming better organized, consumers could shape the system through political action and wholesale purchasing, perhaps promoting the emergence of plans more suited to the needs, values, and financial resources of particular subgroups in the population.

Government, too, has a decisive role to play: as regulator, monitor, standard setter, disseminator of information to the public, purchaser of care, and supplier of funds for research and education.

To channel and modulate the behavior of practitioners, two conditions must coexist. The first is proper organizational design: a system which provides for, recognizes, and rewards quality in care, perhaps by paying more for it when its outcomes are certifiably superior. Both quality and efficiency would be served by arranging for each person to have a personal physician who would be the primary care-giver as well as the coordinator and counselor when care is provided by others.

The second prerequisite is a system for continuously monitoring and adjusting the quality of care. According to one view, monitoring quality and utilization should be, primarily, the responsibility of those who provide care, and should have as its purpose education, not punishment. The role of third-party purchasers, including government, would be to validate the monitoring activity and to aid it with technical support. Others, no doubt, would accord government a more intrusive role.

Can We Afford Quality Care?

Whether we can afford quality or not depends, it seems, on what standard of quality we set. If it is expected that the greatest good that science can accomplish is to be provided for every individual, the answer is that we cannot. We must be prepared to settle for a standard lower than that, a standard that is set by a balancing of the costs of care against its benefits. A prudent consumer would make this choice when the added benefits of care are small compared to the added cost, or when spending money on things other than health care would yield greater benefits in well-being or enjoyment. Society would choose similarly, seeing in how many ways, other than through health care, the general welfare can be more advantageously promoted. In fact, according to one view, it would be immoral to lavish excessive care on some, even if that care is somewhat useful, when others who could benefit even more from health care, or from other services, do not get them.

As a practical matter, it appears that, soon, a "cap" will be imposed on how much, as a society, we are prepared to spend on health care—a limit perhaps expressed as a percentage of our gross national product. To assure that, within that limit, care will be distributed most advantageously, it may be necessary, according to some, to establish a national health service, in one form or another. In addition, if we were to use more widely those (rather few) preventive services of proven value, eliminate all useless care, and achieve other efficiencies in the production of services, we could maintain a high standard of care that, while not maximally effective, would be close enough.

This eminently rational solution ignores, nevertheless, the exigencies of clinical practice, when patient and practitioner meet one-to-one. For, now, our traditions dictate, and the maintenance of the patient's confidence requires, that practitioners respond to the patients' expectations that all that is possibly useful and good shall be done. Some would argue that it would be immoral not to do so. Others would maintain that it is the doing so that is immoral.

It is, unfortunately, on this note of uncertainty, even anguish, that this chronicle must end. And yet, there could be hope, perhaps in a covenant between an informed public and those of us who are to serve them—a covenant that sets a limit on what each can rightfully expect of health care, so that all may reap the greatest benefit from all that life has to offer, health care being only a part of that collective treasure.

What Is Quality Care?

Donabedian: I am going to start the ball rolling with our first question: What is quality? Can we recognize it, or its opposite?

Dr. Eisenberg, who is a physician, will begin. We have a very nicely balanced panel—two physicians, two nonphysicians. We are not balanced in every other regard, but at least we achieved balance in this. Dr. Eisenberg will tell us about his thoughts about what quality is, speaking, perhaps, from the point of view of a physician. That's going to be a little difficult for him, because he's so multifaceted in his interest and approaches.

Eisenberg: I am accustomed to thinking about quality in only one way, Avedis. The way most of us think about it is by dividing it into three parts—structure, process, and outcome. This is a model you developed, and it is now the accepted way to think about quality. So I'm going to stick with that model.

Outcome, Process, Structure

Thinking about outcome, the nonphysician side of me, the side of me that took some courses at Wharton a long time ago, would say that at least one measure of high-quality outcome is when your patients come back to you because they are satisfied. Another way, more popular today, is patients' functional status: We try to measure the status of our patients, the degree to which their function meets their expectations, or meets expectations that we set for them. Still another way of using outcomes as a way of measuring quality is the classic clinical outcome—for example, mortality, morbidity, or perhaps some intermediate clinical outcome, such as ejection fraction as a measure of cardiac outcome in response to a cardioactive drug.

Process is the second major way of thinking about quality. Usually we think about measures that have to do with the process of taking care of patients. Perhaps the hemoglobin A1C is an example here. It measures the degree of control of diabetes, but, of course, that is not what we are ultimately shooting for. Ultimately we are trying to obtain decreases in diabetic nephropathy, neuropathy, retinopathy, and so on. Even this measure might be considered an intermediate outcome rather than process. Another measure of process would be the appropriateness of the tests or drugs a doctor orders.

Another way to think about quality is to measure and evaluate the structure used to deliver care. I was interested to hear in Jack Rowe's introduction that Mount Sinai will soon move into New York's "first hospital of the 21st century." What he implies is that moving into that new building is going to have some impact on quality of care. This third measure of quality—the structure, the building you are going to be working in—is another way of thinking about quality. It is superficial, of course, but it can lead to better process, we hope; and that can lead to better outcomes of care.

Donabedian: It would be ungrateful of me to object to that formulation; I'm going to accept it. It seems to me that it's a rather technical approach—a professional's approach, an expert's approach.

I wonder if we have some thoughts about the ways in which consumers regard quality. What are they looking for? It is likely that the way consumers define quality and perceive it is different from the way in which professionals do.

Are there also broader social purposes that define and specify quality? I would like us to deal with this more general view of quality.

Veatch: I think it is important to think of quality in terms of structure and process as well as outcome. Imagine care that perfectly maximized life expectancy, that squeezed every day, every hour, every minute of life out of a body that it could get. This would be care where no physician or other health care provider ever erred in maximizing life's days. Presumably lots of people would be in comas, but alive. Lots of people would be in severe pain, but alive, in isolation from their families, or in quarantine. Extending life is a nice objective measurable feature.

We can count days, hours, and minutes in a life. Yet I think we can all agree that that is definitely not care of maximum quality. To pick up on what Dr. Eisenberg said, I suspect we would make exactly the same observation about a health care system that maximized one's functional status. That comes a lot closer to what we desire than maximizing days; many of us would say there is something more to quality than maximizing any kind of objective measure. Quality is something subjective. It is some vague mix of mortality, morbidity, humaneness. Probably no one standard of quality can easily be identified. Care satisfying all the objective criteria we could come up with will not be quality-maximizing care.

Now, before I'm labeled a romantic, I protest that I do not want to be. Care that was compassionate and humane, yet did nothing in terms of fighting mortality or preserving functional status, would not be very high quality either. The consumer population is going to have to get together, at least metaphorically, to come to an agreement about what we want from the health care system. That agreement is what we're striving for when consumers talk about quality: not too little, but not too much either. It would be a mix of care that is humane and compassionate, that prevents suffering as well as extends life when it's reasonable and rational to do so.

The most important theme is that quality is inherently a subjective concept. Any rush to quantify by some sort of justification that can come through peer review mechanisms, through numerical computer programs and the like, is going to miss the point. Quality is inherently subjective.

Quality: Subjective or Objective?

Lohr: This may be our first point of departure for the panel. I am inclined to take some issue with Bob Veatch concerning the degree to which quality is subjective, in part because if we believe that, we are left with no place to go in terms of how to improve quality, how to decide whether there are problems with the quality of care, how to identify them, and how to intervene to try to improve them. So I want to take at least a little issue with the notion that quality is purely subjective.

For example, given the structure-process-outcome paradigm, there are a number of places where we can talk about quality in the sense of activities that meet minimum standards for certification. We can talk about specific things that need to be done in the process of care. We can certainly set standards for the use of, say, antibiotics in children that are easily quantifiable and measurable. That is, when you see wrong things being done, you know they are wrong things, and, in principle, you would be able to do something about them (1, 2). Similarly, there are a fair number of relatively objective measures of functional status, although because they are often based on patients' self-report, in some sense they may be viewed as subjective measures. Nonetheless, these instruments let us gather information from patients or from proxies that gives us a pretty good sense of outcome—short-term and long-term outcomes in both the physical and the mental-emotional health arenas (3). So that would be just one way that we can both define and objectively measure domains that relate to quality of care.

Let me go off on a different tack. John Eisenberg introduced the classic structure-process-outcome model we all use in thinking about this whole area. There is another "orthogonal" way of thinking about quality of care that has to do with distinguishing the technical aspects of care and the interpersonal aspects of care. Whereas professionals and practitioners may focus on technical aspects of the process of care and the results of what it is they do, patients and their families—consumers, if you will—are considerably more likely to emphasize this interpersonal aspect of care. The art of care, the humaneness dimension, is in some sense subjective, but it means a great deal to patients. And it is a valid aspect of quality of care.

Is this necessarily the same thing as bedside manner? I'm not sure, but we hear a lot about what people want. They are quite clear about saying what matters to them. What they view as high quality care are physicians and other providers who take the time to explain to them what their problems may be; to answer their questions; to try to place their illness, or at least their symptomatology, in a larger framework; to try to foster some comfortable environment in which discussions can take place about choices of therapy. The study Dr. Donabedian mentioned is focused on Medicare and the elderly, so some of these points are of considerably more concern to them than to younger or otherwise healthy adults. But these issues are probably fairly pertinent to pediatrics. Mothers want physicians and nurse practitioners to take the time to listen and explain. So these are all dimensions to quality that I think we do need to pay attention to, and they are very often measurable.

Donabedian: Could you, Dr. Gellhorn, make some comments on the definition of quality? Talk to us about any problems of quality that you see in your environment.

Whose Quality?

Gellhorn: I think it's important that we recognize two problems: attaining care of good quality and preventing care of bad quality. I think it's equally important to prevent bad quality of care. I want to comment on both the doctors' view of quality, as Dr. Eisenberg discussed, and the citizens' or consumers' position as presented by Dr. Veatch. I really agree with both Dr. Veatch and Dr. Lohr that the caring function is an important aspect of quality, and one that I believe will be emphasized increasingly. But, if the public is going to make the decisions it must make, the political process has to decide on what the qualities of good care are. Then the consumer has to be informed about the extent to which these are met.

We do have evidence that that's moving ahead. The American Association for Retired Persons is asking for evidence on various medical procedures. Is there concrete evidence, favorable or not, that they are effective?

In our state, the women's groups have been enormously interested in the results of hysterectomy studies we carried out, in cesarean sections, in maternal mortality—all issues on which they can have an informed judgment. Similarly, women in our country have had an enormous impact on decisions on radical mastectomy, on forms of treatment for carcinoma of the breast. So in order to have quality input, the consumer must be given information in order to reach appropriate decisions.

I'd like to introduce the thought that there are other people who are concerned with quality. The federal government is concerned with quality, and it is looking at cost-benefit analysis as a measure of quality. The Health Care Financing Agency is analyzing costly procedures to determine the extent of overuse. Therefore, the cost-containment emphasis is a part of the quality of medical care. And the state is another actor in the quality arena; the state is concerned with access, with equity, with outcome. If we are to improve the quality of medical care, the doctor, the consumer, the patient, the state necessarily must all be involved in the definition.

Do We Have Quality In Care?

Donabedian: Thank you, Dr. Gellhorn. It's time we move on to our second general topic. It's obvious that none of our four topics is going to be explored in a definitive manner in the short time available. The purpose, now, is to raise questions to think about subsequently.

So, now we ought to pose the question whether we do have problems of quality. I suggest that, in the remaining ten minutes or so, we talk about threats to quality that are particularly salient in our present environment: as regards prospective reimbursement, various ways of paying for physician services, the growth of managed care, and the growth of the for-profit sector in health care. Do we have a problem of quality in general? Are there changes in our society and our health care system that are particularly hazardous, or particularly helpful to quality? What is the nature of the problem that we face?

I think Dr. Gellhorn gave us a good introduction to the topic. I'm going to ask Dr. Lohr to make some comments, and then invite other members of the panel to participate.

Lohr: Do you, Dr. Gellhorn, want to say a little more about access?

Access

Gellhorn: We have a problem with access, don't we? We have a problem in our nation. The estimate now is that we have 35 to 40 million individuals who are uninsured, who have no form of insurance. Of these, 40% are children living in poverty. Children are the segment of our society we would think should be receiving the optimal in the way of health care. We have tremendous problems of equity and access, as shown by comparing our Medicare and our Medicaid populations. For example, using state data, we find to our dismay that for a Medicaid patient, the chances of having a coronary bypass or coronary catheterization are approximately 40% less. If one is black, the disparity is even greater. One can go on to indicate that we have discontinuity and inequity on the basis of ability to pay. So I would think there's an access problem. Dr. Lohr, tell us what you think of that.

Lohr: I can't believe anybody in this audience wouldn't agree that the nation faces considerable problems of access: for rural and inner-city residents, for people at both ends of the age spectrum, and especially for those who are uninsured. Certainly, some of what we saw in the Rand Health Insurance Experiment clearly suggested that even with insurance, if you are sick or have lower income, you may face some problems of access because you won't seek care for certain problems in as timely a way as might be desired, at least in as timely a way as would persons with more disposable income (4, 5).

Yes, there are clearly problems of access. What you might want to ask, however, given that people eventually do obtain some form of care, is whether we see problems of poor care. In the quality assurance study we are conducting now, we try to think about this question in terms of four main dimensions. First is the overuse of services, which still occurs even in an era of constrained resources. There is a good deal of evidence for the overuse of certain kinds of procedures as has been shown by Mark Chassin, Robert Brook, and others looking at the use of certain diagnostic and therapeutic procedures (6–8). Second, clearly we have problems of underprovision of services. Third, we can have misapplication of otherwise appropriate services—that is, straightforward issues of poor technical care, poor choice of therapy, poor surgical technique, misdiagnosis, and so forth. Finally, you can certainly have problems with interpersonal relations; that's a kind of first screen that patients and their families may use to make some judgments about quality.

Clearly related to access are the problems of follow-up and continuity. Here we come back to whether managed care is a possible solution, or whether it may engender as many problems as it might solve.

There is also a nontrivial issue of impaired providers, one we hear a lot about when we talk to the people who serve on both peer-review organizations for Medicare and state medical quality assurance boards. The boards, in particular, are dealing with large numbers, larger than one might imagine, of physicians with problems of drug and alcohol impairment. I think we can't make any sweeping judgments about the quantity of these problems, but I'd be inclined to believe that they are diffused throughout the system, from the premier institution such as the one we're at today to the barely marginal facility, or the small rural hospitals, or municipal hospitals serving largely inner-city and very poor populations. All this leads me to say that we need very diffuse mechanisms for identifying problems and for trying to intervene to overcome those problems.

Organization and Delivery

Eisenberg: I'd like to address the question you asked, about whether there are major changes in the way health care is organized or delivered that might have an impact on quality. There are three I want to raise questions about.

The first has to do with the increasing organization of care; managed care is an example. Organizational changes are not necessarily the only change we ought to focus on as influences on quality. However, it strikes me that one risk with larger organizations taking responsibility for the care of patients, or populations of patients, is that managed care does potentially remove the close relationship between the individual patient and the individual physician. But if the physician is to be the patient's agent, the patient's advocate; if the patient's desires are to be interpreted by the physician, and the patient is to be educated by the physician in the traditional mold; if we believe that the patient-physician relationship can work, or can work better, then we should be concerned that some organizations might rend that relationship asunder. But, of course, the same organizations might help to glue the relationship together. So it is important to look at these organizations carefully and to study the way in which they deal with the physician-patient relationship.

On the other hand, large organizations do have potential for clinical leadership: for more effective use and deployment of resources; for formal peer review; for developing criteria for entry into practice; for continued education and evaluation of the competence of physicians. Those are the sorts of contributions big organizations (whether they are medical centers, professional groups, or managed-care organizations) ought to be making.

The jury is still out on whether increased organization, which some call the corporatization of health care, is necessarily going to be good or bad.

The second point deals with the often implied concern that a for-profit organization will necessarily behave differently from a not-for-profit organization. I am not convinced that's the right distinction. We all have motivations that are sometimes secondary to our desire to take good care of our patients—and we all should admit it. We enjoy practicing medicine, but we also enjoy its accoutrements. Whether it is called profit, or surplus, or salary is to some extent an accounting artifact.

It is essential that we in medical care have access to capital, and we should think of the role of for-profit organizations in identifying that capital. If in the future we find philanthropic sources drying up, and state and federal funding diminishing, we have to have some place to which we can turn for capital. That may be the private sector. It may be Manufacturers Hanover instead of private philanthropy. We've got to remember that just because it is for profit doesn't mean it is bad, doesn't necessarily mean it will injure the quality of care, so long as adequate safeguards are instituted.

The final point I want to make concerns physician payment. I spend some of my free time as a member of the Physician Payment Review Commission in Washington. We meet about monthly; we talk about how physicians ought to be paid, including whether a resource-based relative-value scale should be instituted. In the context of today's discussion, I'd be interested in what people think about the effect of a resource-based relative-value scale on the quality of care. Health evaluation and management services would be paid more, procedural and technical services would be paid less. What would such a payment scheme do to the quality of care? Will those services we think have been underpaid be higher in quality and higher in frequency in the future? Will those services that are perhaps overpaid, and perhaps oversupplied, be provided less often? Or, as some economists have said, will the opposite occur? Because the pay for a procedure is less, will the physician or surgeon who is seeking a particular income make up for loss in price by increasing volume? (This is a sort of Walmart discount chain approach to health care—profits are more dependent on volume than on price.) We do not know how doctors will respond to changes in the prices they get for the services they provide. Therefore, we don't know what impact a change in method of payment will have on quality of care in this country.

Veatch: I want to clarify what I meant by the subjective nature of quality by commenting on the tension between equity and efficiency other panelists have referred to. It seems clear to me that we can set up methods of measuring different outcomes. In particular, we can measure aggregate improvements in various health indicators; we can also measure equity by using various distribution measurements. I do not doubt that those can be quantified and objectified. What seems to me inherently subjective is the decision about what mix of those various elements constitutes the highest quality care. In particular, whether maximizing aggregate indicators such as those that would be measured through many cost-benefit analysis techniques will in fact produce quality is not an objective determination. I am quite sure that the highest quality care we could deliver in the United States would not be that care that maximizes aggregate health indicators such as morbidity and mortality statistics, even though those are routinely used as quality measurements in various assessments. I do not know how much we should surrender aggregate utility in order to produce greater equity, greater equality in the distribution of benefits, but I am quite convinced that we would make that trade-off, and that it is inherently a subjective judgment call that the people are going to have to make, superimposed on whatever measurements there may be.

Donabedian: We're going to have to deal with the question of equity, an important one, when we talk about money—what we can afford, and for whom. So I'm glad it was raised. Let's think about it until we come back to it later.

In the meantime, it seems we have agreed we have problems of quantity, and that changes are occurring in our society that offer a promise of better quality, as well as perhaps some problems we need to be aware of and deal with.

How Can We Improve Quality of Care?

It's time now to move on to our third theme, ability to bring about improvements in quality. Who is responsible for doing so? What can be done, particularly by the health care professions, consumers, and, perhaps, government? I'm going to ask Dr. Lohr to start, and then see where the discussion leads from there.

Lohr: Quality of health care is the responsibility of a number of actors: practitioners and provider institutions; patients and their families and, perhaps, consumer groups; more broadly, purchasers and payers, including third-party payers; and government in its role of third-party payer. We have to recognize that all these players are going to need information about quality of care and about access; and they need to try to establish some criteria and set some standards. They must begin to understand some of the things Bob Veatch was talking about—the trade-offs between maximizing life expectancy or minimizing morbidity (defined very grossly) versus trying to make more equitable a range of measures of quality of life and health status.

Practitioners need more information on the effectiveness of services and on the appropriate indications for certain services. We need considerably more knowledge about the link between the process of care and outcomes of care. That is, what really does lead to what kinds of outcomes?

Patients need a good deal more information, I think, about when to seek care and when to desist safely from seeking it; they also need to resist demanding certain kinds of services when clinical criteria would suggest those services are not necessary or appropriate. More generally, patients and their families need to be empowered to ask questions. They need to know when to voice their concerns.

In addition, purchasers, insurers, self-insured corporations, unions, and so forth similarly need better information, or better access to information about the effectiveness of services. Purchasers and insurers certainly need to know things about the emergence of new technologies, about when new technologies can be safely substituted for older technologies, and about how and where new and emerging practices, drugs, and what-have-you will fit into a large health care armamentarium.

Finally, the government needs, it seems to me, to know all of these things. Furthermore, it needs to understand better its responsibilities for supporting the acquisition of knowledge, supporting the dissemination of information, and educating.

In short, I think the responsibility for quality of care ultimately resides with all of us. It is not just the responsibility of the professional community. It is not just the responsibility of government. We all have to understand we have a role to play.

Donabedian: Dr. Gellhorn, in light of your distinguished career, first in medical education and now in government, tell us what wisdom dictates.

Gellhorn: I agree with Dr. Lohr on her points. I think we in the medical profession have responsibilities we have not really met well. One is the failure to validate new technology and new therapies. One example close to home: If Dr. James Holland, chairman of the Department of Neoplastic Disease here, did not establish protocols for process and outcomes based on carefully controlled therapeutic trials of anticancer drugs—as he in fact does—we'd be trying things off the shelf in a random fashion. Unfortunately, many therapies are widely used without good evidence of their efficacy. Too often, diagnostic tests and therapeutic procedures are introduced without adequate evaluation. This can lead to inappropriate use in clinical practice, which may be overuse, or underuse, or erroneous use.

The state has a responsibility to monitor and maintain quality medical care. In New York, the Malpractice Act of 1985 defined the responsibilities of hospitals and of the Department of Health to meet appropriate standards of medical care and of safety of patients. These included the functions of quality assurance committees, the reporting of adverse outcomes, and the prompt initiation of corrective measures when deficiencies are identified. The Department of Health is mandated to be the public's advocate.

One additional measure to maintain and improve the quality of medical care: in 1986 Governor Cuomo proposed that all of us in the medical profession be recredentialized periodically for the privilege of practicing medicine. This concept is designed to provide assurance that appropriate standards of practice are maintained. It is a recognition that the initial license to practice medicine does not confer a lifetime guarantee that knowledge and skills will be maintained. It is a form of public accountability. The governor's proposal is in the hands of an Advisory Committee on Physician Recredentialing, which is developing the process for implementation. So I align myself with Dr. Lohr. Improvement in the quality of medical care requires the involvement of doctors, the public, and government.

Donabedian: Dr. Eisenberg, do you want to say something about changing physician behavior—getting physicians as well as other health care professionals to do the right things?

Eisenberg: I'm enamored of Wordsworth's comment that "the child is father to the man"; and I do suspect that some habits and some ways of thinking are bred into medical students and last for a long time, influencing the way they practice. I have attended a lot of curriculum committee meetings that have been wasted if that's not true!

Yet when we look for evidence that a particular curriculum in medical school improves the quality of care physicians give, we come up lacking most of the time. It is more a matter of faith. Ditto for the residency. In fact (although I certainly support the idea of recertification, including some measure of physician ability to stay current with recent literature), even board certification has not been demonstrated to be associated necessarily with higher quality care.

The American Board of Internal Medicine deals with this issue frequently when we ask ourselves whether we're measuring the competence, or the excellence, of internists with board certification. So we measure both competence and excellence. But it is very difficult, anywhere along the spectrum from undergraduate medical education to continuing education, to demonstrate that measures of knowledge or even of competence make any difference in the quality of care.

So many forces are at work on the practicing physician. We've talked about financial incentives and about organizational incentives and the structure in which the physician practices; we've talked about measuring clinical competence. They all have a simultaneous impact on the way in which physicians do practice. My feeling is that what we need, more than anything, are organizations designed with quality assurance and quality assessment in mind; and new ways in which we can provide physicians with incentives to provide higher quality care. Maybe we ought to pay doctors more for higher quality care. Could we develop some parameters of outcome that we believe are solid, and pay physicians more if they achieve those outcomes in their patients? I'm not suggesting that we go back to the Babylonian code of Hammurabi—paying a physician for high-quality outcomes, but asking physicians to pay a penalty if their patients did badly. Some have even suggested that we publicize the outcomes of physicians to patients, to the community, assuming we have solid enough evidence to measure quality. Then the incentive is more patients for the physician of high quality or for the physician who has high quality outcomes. I do not think we are ready to go that distance, because I'm not sure that the measures, at least for an individual physician, are solid enough. But we do need to develop better measures of quality and ways of providing incentives, organizational support, and clinical leadership to help physicians achieve quality.

Consumer Concepts of Quality

Donabedian: Publicizing the performance of hospitals and physicians is obviously a step that leads us to the role of the consumer. Presumably consumers, given information about quality, will act in rational ways to regulate the system. Therefore, we ought to spend a little time on the role of the consumer—a very important player in the domain of quality. Dr. Veatch has had an easy, quiet time for the last 10–15 minutes. I'm going to ask him to make some comments; and I saw Dr. Lohr's hand up, so we'll move on to her afterward.

Veatch: I'm a little bit nervous about being thrust into the role of the consumer. I am a licensed health professional; on the side I am a registered pharmacist. I have been on medical school payrolls now for about 20 years. I do not quite feel like a typical consumer anymore. Some of the medical professionals with whom I deal do not think of me as a typical consumer.

Let me get back to the implications of my thesis that quality is inherently a subjective notion. If that is true, consumers will have to be much more active in defining what their notion of quality is. Consumers have not been very good at this, in part because they have been seduced into believing that good medicine is measurable entirely by scientifically definable criteria.

If indeed quality has subjective elements, different consumer group will have different concepts of what counts as quality. They are going to have to articulate those concepts, and it is quite likely that in the future there will be different delivery systems, each working with its own concept of quality, defined, at least in large part, by the social group that collects around that delivery system. I try to imagine what high-quality feminist health collectives look like, and how they would compare with quality care delivered at the Oral Roberts Hospital in Tulsa. My guess is that if the consumers and the providers in each of those systems got together and articulated what they meant by quality, they would have very different notions in mind. I do not see how we can even set out to measure and define quality until we get these groups of consumers articulating what their goals are for the delivery system.

Lohr: I agree that consumers today do not have a particularly good sense for the technical aspects of quality and how to judge it. Also, we do need to make more information available, but it is very hard to know how to make interpretable and easily understood information available to consumers when even the provider community continues to grapple with these problems.

Moreover, one of the reasons consumer groups have not heretofore been much concerned with quality of care, or at least able to intervene with respect to it, is that they have been so worried about access. We have had 15 or 20 years of a push to improve access—rightly so; that cannot stop. Only in the last few years, partly when faced with constrained resources, have consumer groups become more interested in and concerned about quality. So I expect that that situation will improve and that we will begin to see more sophisticated consumers—either individual consumers or, more to the point, consumer groups.

With respect to the Office of Technology Assessment report (9): That report was dubious about the direct relationship between quality of care and simply holding board certification. It does suggest, however, that if physicians who hold a board certification do practice in the specialty in which they were trained, we will see higher quality care. That is a concept studied by one of the "deans" of this field, Beverly Payne, and I would like to make that distinction clear because we do not want to see rampant retreat from board certification.

The third point I wanted to come back to was also Dr. Eisenberg's point about organizations. A paradigm of quality assurance has emerged in nonhealth industry, and it is starting to percolate into the health care field. It is a concept that places a great deal of emphasis on internal quality assurance mechanisms. To the degree that larger corporations, HMOs, and the other new hybrids, as well as large facilities such as this one, can begin to think through how they will identify problems, tackle them, and carry out a whole range of internal quality measurement and quality assurance activities, that will be all to the good.

That brings me back to the idea that everybody needs to be responsible for quality. In a provider organization, this includes the physicians, the nursing staff, the dieticians, the support staff, the receptionists, and so forth. To the degree that we are seeing bigger aggregations of providers, there is a fixed base from which to try to improve internal quality assurance. Then, the role of the government is to help validate that those are good mechanisms internally and to provide technical assistance in areas where it is needed, instead of coming in as the punitive quality monitor.

Donabedian: We are still dealing with the general topic of what can be done to obtain higher levels of quality. I would like to give the panel free time to participate as they wish. We do have a few more minutes to deal with this topic before moving on.

Gellhorn: It seems to me that Dr. Lohr has indicated again the responsibility of patients collectively to make some decisions. These decisions should be based on an understanding of the facts. But look at what a miserable job we do in medical school and elsewhere in the area of health education. We give it short shrift. Even at a distinguished school of public health in Boston, the Department of Health Education was a second class citizen. Little emphasis was given to it in the curriculum, and even this minimal attention was far greater than that accorded to health education in medical schools. The technique and content of health education requires as much attention as any other educational area. The current uncertainties and vacillations in AIDS education are pertinent.

Dr. Veatch mentioned that consumers have not been very good at defining quality care. I agree. The majority of patients think their doctor is fine, but doctors collectively are reprehensible. This paradox is often related to subjective versus objective criteria. If the doctor is well-spoken, not too hurried, even a bit attentive, he or she is rated highly. If, however, the patient is asked whether the doctor took the blood pressure, listened to the chest, carried out appropriate preventive medicine measures, the patient's evaluation may change significantly. Consumers need to be more sophisticated about criteria of quality of care than I believe they are.

One other thing about education: Dr. Eisenberg raised the question whether the Physician Payment Review Commission would be of any benefit. It seems to me that reordering of reimbursement priorities to favor careful history and physical examination over procedures is a recognition that we do not have enough generalists. We need more primary care physicians. The way to increase the number is greater equity in compensation. In the State of New York it has been explicitly stated that one of the goals of graduate medical education is to increase the number of primary care physicians; and what is going on in Washington is going to help out in that regard.

Identifying Consumers' Preferences

Eisenberg: I'm concerned that when we discuss patient education, we sound like professional imperialists. I hope patient education will not be segregated in a separate course in health education; it ought to be part of the whole process of learning how to communicate with patients. Teaching it ought not to be assigned to psychiatrists and some health educators. I do not demean their contribution, but delegation means that everybody not delegated gets to abrogate their responsibility.

I do not think we know very well how to measure the things patients feel are important. But that doesn't mean we are not measuring these outcomes at all. It may mean that we have not identified the ruler being used. There is a lot of research today in measuring what are called multi-attribute utilities. This means that patients have utilities, or values, that have several attributes, and those attributes can be measured. The fact that those rulers are being developed may enable us to ask whether some development in technology will lead to better quality of care. Perhaps these new measures will help us with our quality assurance and quality assessment and, ultimately, in the delivery of better quality of care for our patients. Once we understand how to measure patients' utilities and values, we can try to learn how to translate those utilities into the kind of care we should provide.

There is one other issue that may be technical but that I think is important: the element of time. When we measure patients' utilities in medical care, we're generally referring to utilities for an event that may occur in the future. We know that people do not value events that happen in the distant future as they value today's events. That's why we pay interest to people who are willing to lend us money: because we value future events less than we value events that occur today. What we do not know is how to account for this so-called time preference when we measure the quality of care. So as professional imperialists of a sort, we tell our patients they should sacrifice the here-and-now in order to benefit in the future; we think it's better for them. But should we rather recognize patients' preference for benefits and satisfaction today over benefits in the future? We would then just bite the bullet and realize that we're going to be providing some care to them that may not be exactly what we think would ultimately lower the measured morbidity maximally. But it might maximize the overall discounted satisfaction of patients.

Donabedian: Dr. Eisenberg, expand a bit on the problem of utilities by adding perhaps one of the most complex considerations—that of money—to the calculus of individuals and to the social calculus.

Eisenberg: The problem is we have constrained resources. So we cannot maximize quality—we must settle for optimizing quality. The difference is large. I think we ought to measure quality—measure effectiveness, if you will—and also measure cost, then integrate both in our decision making, so that we can get as much value for money as we can, given limited resources.

I should raise the question of whose cost we are discussing. Are we dealing with cost from the perspective of society, the hospital, the payer, or the patient? If you ask me what's the most cost-effective way to deliver care to a patient, my first question has got to be: Whose cost? Our conclusions on cost effectiveness depend on the answer to that question. For the hospital, it will be most cost effective to discharge a patient when the organism causing an infection has been demonstrated to be sensitive to antibiotics, and you can get the patient into a home care program. But if the patient doesn't have insurance for home care, the patient will not consider home care the most cost effective. Perspective is important.

Can We Afford Quality Care?

Donabedian: Dr. Veatch, put on your professional ethicist hat—right now you're no longer a consumer—and start to deal with the relationship of cost to quality and the relevance of cost considerations to social policy in health care. This is such an important topic that we should also hear from each of our panelists separately.

Veatch: We have been moving toward this topic looking at the question of what it is we want to maximize. The comments just made about multiattribute utility measurements may help us incorporate multiple goods into our judgment of quality. But I suspect the problem will not be solved even if we can measure preference utility functions of various sorts—including multi-attribute functions. It is not clear to me that we want to maximize utilities at all.

In deciding what quality care we can afford, I feel we have to start by making a distinction between care that is useless and care that is beneficial, but only marginally so. Much of the quality assessment debate fails to make that distinction.

Of the two, useless care is certainly ethically the easier part of the controversy. I am talking about care that can be demonstrated to be harmful; perhaps certain classes of hysterectomies might be an example, but there are many. It is ethically easy because no one is going to push for the delivery of that care. In fact, we improve quality of care by eliminating the useless and harmful element from the delivery system. And, in that sense we can not afford anything else. Peer review is usually quite good at spotting certain elements of care that are useless. We can use objective medical measures for demonstrating that certain interventions are useless, and eliminate such useless services. In fact, if we affirm the autonomy of patients, then if only they were adequately informed, they would rationally refuse such useless care especially if it had the potential for harmful side effects.

The real ethical controversy, it seems to me, is in the area of marginally beneficial care, where we can get extra increments of what we would all agree is benefit, but at decreasing marginal utility. If one envisions adding increments of resources bit by bit, we finally get to a point where we are delivering maximal quality care. Adding more resources adds no further quality.

No matter what definition of quality we are talking about, it is morally wrong to deliver that maximal quality of care. I am in an HMO that ought to be sensitive to these considerations. I complained a few years ago about a sore back muscle. My HMO physician prescribed a series of private physical therapy sessions. I doubt that from the point of view of a rational consumer of health care who was a member of that HMO, that extra increment of quality was sufficient to justify the extra expenditure. The problem was probably self-limiting. The therapy probably helped marginally at best and was quite expensive to the HMO.

Health care professionals are not good at deciding how far we ought to back away from that maximal quality of care. Health care professionals have been trained since the days of Hippocrates to do what is best for the patient. And some clinicians still take this literally, delivering care until they get out to the break-even point where another increment of resources will do nothing more for the patient. It seems clear to me that consumers, if they are given a choice, would refuse that last increment of quality. They would want to stop at something below maximal quality care, at least if they are paying for the insurance premium. Deciding how far to back away from that maximum quality is inherently a nonscientific question that involves trade-off with other uses of resources—nonmedical as well as medical uses. The correct stopping point is definitely something below maximal quality care.

The strategy that makes the most sense is to get groups of such consumers together and ask them to set limits under certain constraints. In insurance systems, one could get groups of insured consumers or their representatives together and ask them whether they want to pay for particular increments of quality. Ask them whether they want to pay for 365 days of hospitalization for private psychiatric inpatient care per year, or only something like 100 days. Ask them whether they want to pay for providing yearly physical exams or sustaining patients in persistent vegetative states. I am quite convinced that if we could get the insured or their agents together and ask them, we would be able to discover that we indeed do not want such marginal benefits. It would be irrational for us to choose maximal quality care. We want something less than that. The critical feature is going to be making sure we do not back away too far.

Gellhorn: Dr. Veatch is very persuasive. It seems to me, though, that we have an even larger ethical issue. I think that anybody who is rational would recognize that we are rapidly reaching in our country a decision that there is going to be a cap on the amount of money that is going to be expended on medical care. I think that's just as clear as it can be. I don't think that we need this Congress, faced with the enormous deficit, to tell us that. I think that the decision to allocate much more than, or even as much as, the current 11% of the GNP to medical care is beginning to cut into other areas we're concerned about: education, art, culture, and so on. So we're going to have a cap. The ethical issue is, Are we as a society going to continue the way we are at the moment? Or are we going to be deciding that as a society we better be concerned about the issues of access and equity, and recognize that we don't have them? Are we therefore going to say that our current system, which is a hodgepodge of mechanisms for paying for the cost of care, is a very poor one, and therefore we're going to have a form of universal health insurance?

Donabedian: We're approaching the limit of our time. But this is such an important topic that I would like the two other members of the panel, if they wish, to comment on the issue of cost: Whether we should pursue the maximum improvement in health care, or back off to some kind of optimum? Whether rationing is going to be necessary and in what form?

Lohr: I agree with a couple of points, particularly the ones Dr. Gellhorn made. We will reach some spending cap. Society will decide pellmell that it is not going to spend more in the aggregate than some figure—it may stop at 11% of GNP; it may go up to 15%. But at some point, we're going to decide that enough is enough.

The real question is whether the resources put to health are allocated properly. It will be unconscionable to continue to have 12% to 15% of our population totally unserved. We will need to make some reallocations to take care of that problem. Whether we will have to talk about two levels of care, or explicit rationing, is unclear. I am not so sure we will have to get quite that draconian (10). I say that in part because it seems clear we misspend an enormous amount of our health care resources either on the marginally beneficial unit of care or, in fact, on ineffective services. To the degree that society can come up with some research monies to try to help us to understand better the effectiveness of services and to develop appropriate indicators for the use of services, to that degree we can begin to rationalize our health care system within cap.

I also second what I hope is and will stay an accurate prediction: we will eventually see some sort of a universal health insurance system instead of the hodgepodge that we have now. The nonsystem is significantly inequitable across the states for the poor as well as for the middle class.

The Cap Is Coming

Eisenberg: I think the cap could be coming; perhaps more accurately, it may come as a target. In fact, this is being discussed in Washington today, as people talk about how we are going to control volume in the Medicare program. If the target is exceeded, in the following year physicians' prices—the fee they would receive for each service—would be decreased. Inevitably we would not have as much of a spiraling increase in health care cost as we have today.

Although I see a target as inevitable, I wish I had a better idea to control health care costs. The problem with target-setting, as I see it, is that decisions are made as a group. But when the rubber hits the road, it's the doctor and the patient in the room together. It's the patient with a headache who says, "I want a CT scan"; it's the patient with an infection who says, "I don't want an antibiotic that is 95% effective, I want the cephalosporin which is 99% effective." Those decisions are the real ones. They may be trivial from the point of view of national health policy, but that's where the real ethical dilemma lies, I think—not in ethics committees deciding whether patients should be put on respirators; not in guidelines established by a professional society on recommended screening tests. But the doctor and the patient sitting down together.

Questions and Answers

Question: It does seem to me of interest that the panel hasn't used the words "preventive health" at all. The health care system involves more than the implicit assumption that we're talking about people who are already sick. In fact, cost-benefit analysis can readily show that immunization and sanitation, and perhaps more effective tobacco education, would do vast amounts for the public health of this country.

Preventive Medicine

One of the measures used in cancer research, and I think in other fields too, is years of potential life lost—which means that the death of an octogenarian six months later than expected, after an enormous outlay, isn't perhaps as significant as a teenager's suicide, or a young mother's dying after a botched back-street abortion because of local or state laws, or a loss of any young life. Thus, I think one of the policy decisions might well be whether Medicare, which devotes its money and perhaps 25% of overall health costs to those who are already past 65, might more effectively be reorganized to put much more money into the health care of the young, the children, the neonates—who, gaining through proper nutrition, through proper immunization, would be better educated (as we've certainly seen in fact) and would have greater health and stamina, and thus decrease the total health care outlay over the course of the next 50 or 100 years.

Eisenberg: I will not disagree that preventive services ought to be improved. But I will disagree that they necessarily will save money. In fact, except for a few preventive services, they don't generally save money. But they may improve quality. We get back to the question of whether that's the way we want to spend more money to get more quality. That is, whether we get more units of quality per dollar spent on prevention than through other expenditures. Even if you don't worry about the problem of time preference that I mentioned earlier, in most cases prevention does not save money. If you do introduce the problem of time preference, you have the problem of an outcome 20, 30, 40, maybe 70 years hence that needs to be discounted.

Those Suffering Now

Veatch: I, too, have spent many years puzzling why we have not given more emphasis to prevention, not only because it can be cost saving, but also because it is humane in preventing suffering in the first place. I puzzled over that until I began hearing the defense of preventive strategies in cost-benefit terms. Even putting aside the problem of whether there really are cost-benefit payoffs, which I assume there are, at least in some cases, a great deal of work is being done on the ethical justification of using cost-benefit strategies in the first place. Insofar as one doubts that maximizing some health indicator, in aggregate, is the proper standard for assessing quality of care, doubt arises over emphasizing preventive strategies as a means to maximize aggregate benefit.

I am increasingly impressed by the tenacity of the public in its resistance to prevention and its preference for very inefficient interventions to protect the identifiable lives of those already ill. I suspect there is something much deeper going on than is being tapped in typical cost-benefit analysis.

I am increasingly convinced that there is something very deep in the Judeo-Christian tradition, and in its secular analog, that gives very high priority to suffering in identifiable lives. We talk about "neighbors" in that tradition. I do not think anyone has done the work to figure out, ethically, why identifiable sufferers get higher priority, but they clearly do. While I strongly support all sorts of preventive strategies, my guess is that there are equity grounds for diverting resources to those now suffering, for whom we invest enormous sums for very small statistical payoffs. Until we understand the ethical appeal of that identifiable life, we are not going to make progress in the direction of a preventive strategy.

Any Relation between Quality and Malpractice?

Question: I want to follow up on some comments and questions about expense and incentives made by Dr. Eisenberg and by Dr. Gellhorn—his remarks on education—by asking whether there is any known relationship between the quality of care and professional medical liability or medical malpractice. For the last six or seven years I have been teaching doctors risk management and quality of care in the hope and trust that these lessons would do two things: first, reduce their risk of liability; and, second, what we are talking about today, improve the quality of care to their patients. The insurance department has not seen, as I have, any definite relationship between the two. Do you have any comments on that?

Gellhorn: Yes, I think so. Certainly one of the objectives of periodic physician recredentialing in New York is to provide the public and patients with reassurance that their physicians are maintaining appropriate standards and knowledge of the standards of medical practice.

It is my conviction that if there is to be reform in the tort system of medical malpractice, the public must be convinced that the medical profession is current in knowledge and skills. This is being recognized nationally. Seventeen of the 23 specialty boards are giving time-limited certificates and requiring periodic recertification to maintain the specialist designation. Further, 15 of the 24 medical specialty societies have developed, or are in the process of developing, guidelines of practice in their specialty. The anesthesiologists have developed standards for the care of patients under anesthesia, and anesthesiologists' liability insurance premiums have been reduced by 15% to 20%. The American College of Obstetricians and Gynecologists, jointly with the New York State Department of Health, has developed precise definitions to reduce the numbers of cesarean sections, and an educational program is in progress in the state for all obstetrical services. I am confident that this will reduce the frequency of cesarean sections and also of unjustified malpractice actions.

Lohr: Just a couple of points on that score. I think I interpreted your question a little differently from what you may have intended. The Office of Technology Assessment report (9) that came out some months ago did look at malpractice claims, suits, awards, and so forth. As best I recall from that report, one can show very little relationship between malpractice and anything truly related to quality of care. We have a gut feeling that any institution or practitioner who might be sued over and over probably warrants looking at. The mechanisms available through the Health Care Quality Improvement Act and the database that is being set up may give us information that would let us figure out whether there is any relationship. But, at the moment, I would not rely at all on the strength of malpractice suits as a clear-cut indicator of quality.

Related to that is the point that Dr. Gellhorn was making. We are seeing more and more that institutions are integrating the quality assurance, risk management, and utilization management functions. There is no earthly reason that I can see why those functions ought to be separated, with different people doing different things. Rather, quality management systems are in place that will let you do all of this. For instance, good risk management will, in fact, identify problem areas where you may be able to mount relatively quick interventions before a quality problem progresses to the point where you have a very dissatisfied patient or family bringing suit.

Dialysis Patients vs. Sick Children?

Question: I'm Dr. Jacoby. I detect in the panel a negativeness, a frustration, about what we're facing today in quality. I think we as a profession don't take enough credit for the changes that have been made. I was trained at City Hospital 20 years ago, when that hospital and many others had open wards. Patients weren't getting care they needed; patients had end-stage disease and many had no access to care as compared to today. So I think we've made tremendous progress, in both quality and quantity. And I still think we're on the up side of the cost-benefit curve. I still think there's room in America to provide terminal cancer care for the elderly who need it and require it, and still immunize the children, as is being done in America today. I don't see why there should be a cap; I don't see why we should lie down and take it. This is an industry in America; it provides jobs for people; it provides health care for people. If we could get the economy going a little bit, people could work. Maybe we could afford to provide all the health care people need without having to make the hard choices. Otherwise, we're dogs fighting over a bone. You'll have the dialysis patients fighting with the sick children. That's very unseemly to me.

Donabedian: Does anyone want to comment on this more optimistic, more challenging, less resigned view of the future of quality in this country?

Veatch: It makes me nervous to hear someone talking about delivering all the care we need. If I am correct that rational consumers would purposely not want all of that care delivered, then an agenda that holds that out as the ideal and continues to strive for it is going to be misleading. In no other social sphere do we fund ideal or maximal levels of social support. We provide education as a state service up to a certain point. But no one even dreams of funding all of the education that anyone needs or desires. The same is true for food, for housing, for any other social sphere. It is the nature of scarce resources that the rational way to do things is to make sure no one gets all that he or she could possibly want or need. I think talking about caps of 11% of GNP, or 15%, is a crude way of discussing roughly how much of our resources ought to be devoted to promoting well-being in the medical sphere as opposed to these other spheres. We seem to agree that the percentage is going to come out in the neighborhood of 10%, 11%, 12%, 15%, the exact number is somewhat arbitrary. It will depend on one's theory of what a fair allocation is. Certainly there will be limits in medicine, as there is in any other sphere of life, if we are dealing with rational uses of resources.

More on Access: Recruiting for Insurance

Question: I would like the panel to address another question on access. A large body of literature shows that if patients have access to ambulatory care prior to really getting ill and being hospitalized, their hospitalizations are shorter and their illnesses less severe. The large number of uninsured people in the United States are not all indigent. A large percentage are people who could afford insurance at one point, but later lost their jobs, and then don't have easy access to insurance. I think these people are easier to enroll in programs such as some of the experiments that are going to go on in New York over the next few years.

I wonder what strategies the panelists might propose for enrolling those other people who are not used to having access, to having insurance, even though there are good experiments providing insurance coverage for this group. These people are not indigent, but well off enough to have had insurance in the past.

Gellhorn: I can respond to you with regard to the New York experiment. For 1988 the legislature has allocated $28 million for just exactly that group. Half of that is being utilized by the Senate under the direction of Senator Lombardy. He is aiming that at catastrophic insurance. The other half, just for the current year, is being utilized by the Health Department and Requests for Proposals have gone out to all insurers to indicate that the state will insure just exactly the group you have identified. We are requesting an indication of what health care services will be provided by insurers and how they will recruit. I think the recruiting is not going to be so difficult. The question is whether one can get the appropriate number of insurers to accept this. There have been some responses. Blue Cross/Blue Shield has responded; and my guess is this will go forward in the next calendar year.

Who Makes Medical Decisions? When?

Question: I've been a physician and a medical educator for many years. My observation is that high quality amongst the physicians with whom I've worked and whom I've observed is associated with those who are well educated, who keep up to date, and who are capable of making independent decisions under great stress. What I'm wondering about is, with so many people looking over physicians' shoulders, what will happen to the effort or goal of educating our young doctors to value independent decisions?

Eisenberg: Would you define what you mean by valuing independent decisions?

Question: Yes. There are many consultants on a complicated case. There are many family members to talk to. There is the patient to talk to. There's one's knowledge of the literature to consider. Then a decision needs to be made with patient and doctor. Often I have seen this made more or less by committee, and not work out well. I remember getting a group of many doctors together in a room with a medical student; and we worked the problem out, as a group, then somebody made a decision. The student said, "I've always heard about this kind of thing, but I've never seen it before." The point is, somebody got all those players together, got them to interchange just the way this panel has been interchanging, and then reached a decision.

Eisenberg: I think you've raised a number of important issues for practice and education. I'll just touch on three.

First, I would be willing to assert that one of the best measures of quality of care is the opinion of a physician who has referred patients to other physicians, who has discussed patients with them, and who has a sense not only of their knowledge, but also of their decision making, their compassion, their humanity, and all the components that we think of as constituents of clinical competence. That would lead one to conclude that perhaps one way of assuring quality would be to be sure that you have a case manager.

You raised a second issue, of a lot of simultaneous input by different people who don't know the patient very well—perhaps personifications of the blind man and the camel who each see the patient from a different perspective. So you need to step back to synthesize and integrate all those different opinions. Again, you suggest a role for the personal physician—the physician who has known the patient for a long time, who knew the patient's values before the acute event, who knows this patient has a history.

I think you raised still a third issue, about medical education. You described the classic scenario—a group sitting around the bed of the patient for whom the decision is being made. The duration of that patient's stay is getting so short, and a decision has to be made so quickly, that often we don't have time to get the whole team together and discuss these things. We have to think about other venues for medical education. We could involve the student in decision making before admitting the patient in the first place: we could talk about the patient's values before the acute event occurs, rather than in the stressed situation when the patient is in the hospital. Maybe teaching in the context of hospitalization will be the exception in the future, not the rule.

Donabedian: Thank you very much for participating in this seminar. We enjoyed having your questions and answers. And I hope we have given you some entertainment, if not some degree of enlightenment.

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Installation of President

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Inaugural Address

JOHN WALLIS ROWE, M.D.

Address delivered at the author's installation as fifth president of The Mount Sinai Medical Center on December 6, 1988.

One hundred and thirty-six years ago the founders of the Mount Sinai Hospital had a vision—they sought to provide the very best in health care. After more than a century of dramatic success which brought national and often international attention to our hospital's excellence, that mission was further broadened. Twenty-five years ago the Mount Sinai School of Medicine was founded, deepening a long-held commitment to education and research. This fusion of a hospital with a medical school created a large academic health center and greatly expanded Mount Sinai's capacity to serve society's needs in managing today's illness and enhancing tomorrow's health.

Over the last 150 days, I have come to know firsthand the remarkable quality of Mount Sinai's people and programs, and the intensity of our commitment to excellence. But I also feel the winds of change—nationwide changes intensified and complicated by local factors here in New York City—changes that will force major alterations in the function of academic health centers.

Who could have predicted the course American medicine has taken or the decisions now before us? Certainly those wise and dedicated men and women who established this hospital in 1852 in the midst of epidemics of cholera, yellow fever, and typhus never imagined the diagnostic and therapeutic approaches that are now commonplace. I doubt that many, if any, of those more recent leaders who established our School of Medicine in 1963 could have foreseen the fundamental changes we now face in research, education, and clinical care.

Three Areas of Transition

On the national scene, three major areas of transition stand out as having the greatest impact on the function of our academic health centers.

First, we have entered an era of unprecedented biological discovery. Remarkable new research findings and methods are becoming available almost daily and are providing a deeper understanding of the nature of human biology and the mechanisms of disease. These insights and tools must be rapidly incorporated into the very fabric of the scientific life of this academic health center, for they are already yielding new approaches to disease prevention and treatment, and the promise for the future is very great indeed.

Second, across America, previously unimagined numbers of individuals are surviving into old age. Twenty-eight million people, more than one in ten of our population, are now over 65 years old. But the impact of this demographic time-bomb is underestimated by the numbers of older persons. As people age they accumulate disease, disability, hospitalization, drugs, and doctor visits, and utilize a dramatically disproportionate share of our health care resources. The 10% of our population currently over age 65 accounts for 40% of our hospital days and a full third of our national health expenditures. By 2030, one of every five Americans will be old and—like it or not—care of the elderly will dominate American medicine. We are ill prepared to cope with the aging of America. Our research manpower and training capacities in geriatrics are woefully inadequate. Despite the imminent and obvious need, our health care system seems frozen in fear as the tidal wave of aging begins to crest.

Third, there is an important shift in society's

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view of medicine—a growing impatience with a health care system which is viewed as draining the nation's resources while serving only a segment of the nation's health needs. There is a growing opinion amongst political leaders as well as the private sector that the full medical bill has been paid but the full service has not yet been delivered. Disenchantment and distrust are rising with a system which emphasizes high technology treatment to the neglect of health promotion and disease prevention. The call is clear for a shift to a greater public service in health care.

This change in attitude toward our profession is echoed in the trends in medical education—away from the production of technology-bound superspecialists to an emphasis on primary care physicians expert in the basic fundamentals of medicine and skilled in communication with the patient and the family. Society, and leaders of our own profession, seek more physicians, not technicians—a return to plain old good doctoring—matched with thoughtful application of modern medical technology.

Medicine in New York City

For New York City's academic health centers, these national changes are magnified in intensity and further complicated by a number of important local factors.

New York medicine seems to be bathed in crisis.

We are fighting an epidemic of acquired immune deficiency syndrome, which ravages our city more than any other American city, flooding our health care system as it rots away entire segments of our society.

We are not responding adequately to the challenge of the "new biology." We sit numbly and watch the steady flight of the brightest young talent from New York's clinics and laboratories to other less expensive cities and to, perhaps, more vigorous centers of biomedical excellence. This brain drain threatens the infrastructure of our academic health centers, the cathedrals of New York City's health care.

We are facing increasing regulation—regulation that is well intentioned, designed to answer society's demand for quality care and access for all—but nonetheless regulation which forces us to respond and change.

The capacity to respond to these national and local challenges is being drained from the veins of New York's academic health centers as we suffer increasingly severe fiscal constraints. Despite the highest overall occupancy in the nation, New York's hospitals rank last of the 50 states in operating margins, and face enormous deficits. As we struggle to provide care for a large indigent population, our hospitals have become clogged with patients who should be, but cannot be, discharged—a clinical gridlock, induced at least in part by the lack of a health care *system*. We lack appropriate resources to care for patients when they no longer need hospital care but cannot manage at home—or have no home. These fiscal constraints threaten not only our innovative clinical and social programs but our research and educational capacities as well. For in a modern, fully integrated, fiscally interdependent academic health center, when the hospital begins to bleed, the medical school goes into shock.

But we should not be surprised by these special problems—New York has often been the scene of medical stress. This enormous and complex city has also long been characterized by conflicting excesses: great wealth and severe poverty; the highest intellectual and artistic achievements and epidemic illiteracy; the finest medical care available anywhere and persistent deep pockets of malnutrition and high infant mortality.

How can New York endure? E. B. White's comments, although penned nearly 40 years ago, never seemed more accurate than they do today: "By rights New York should have destroyed itself long ago, from panic or fire or rioting or failure of some vital supply line in its circulatory system or from deep labyrinthine short circuit" (1). But New York endures—and more; John Mollenkopf notes that it seems as if, through this concentration of extremes, New York "reveals forces, trends and conflicts that are latent elsewhere" (2). I see New York as an enormous crucible in which tension and stress facilitate the emergence of innovations in the arts, in finance and commerce, in education, and in science and medicine.

Intensification of the national trends, complicated by these special local factors, has brought New York's medicine to the brink of a major revision in the function of its academic health centers. The evolutionary pressure is greatest here, and traditional medical centers must remodel in order to survive and thrive. The survivors will be fully capable of responding to society's needs as well as the revolution in biomedical science, and will serve as models for the next generation of American academic health centers. Mount Sinai is very well positioned to play a major role in defining the prototypic academic health center of the 21st century.

Guiding Principles

So here we stand—the Mount Sinai Medical Center—blessed with remarkable tradition—in the throes of rebuilding our physical plant—bathed by crisis. As we identify our specific objectives for the next decade and prepare Mount Sinai for the next century, certain principles will guide us.

We stand firm in our commitment to the highest quality care for all New Yorkers.

We stand firm in our commitment to excellence in research and are increasingly conscious of the need to strengthen the links between research and application.

We are committed to enhancing our interdisciplinary efforts. More and more frequently we find—in the laboratory, in the clinic, and in the operating room—that the solutions to the problems we face are beyond the tools of our individual disciplines.

We are mindful of our responsibilities to serve society as a truly integrated academic health center. In this time of fiscal austerity, we must avoid the temptation to systematically favor revenue-enhancing clinical activities to the serious neglect of research and education. For despite our severe financial and space restraints, allowing major academic activities to wither in favor of enhanced clinical activities is shortsighted. Our efforts on this campus, at our affiliates, and in the community must include robust health care services, research, and education. Only through this authentic full-thickness effort can we make the greatest contribution to the nation's biomedical capacity and to the health of New York.

Four Goals

As we prepare Mount Sinai for the 21st century we face four immediate goals:

Our most pressing goal is clinical. After a decade of sustained effort, generosity, and sacrifice we are completing the largest hospital reconstruction project in United States history, including a magnificent new structure, one million square feet, state-of-the-art in its design, filled with the most modern and sophisticated diagnostic and therapeutic equipment—yet just a building. We must work together to convert this long-awaited edifice into the new Mount Sinai Hospital by infusing into it broad clinical capacity of the highest caliber, consistent with our long tradition of clinical excellence. This conversion from bricks and mortar to an outstanding hospital is neither automatic nor easily attained. It will require a conjoint effort on the part of all of us. The result can and should be a hospital marked by a productive partnership—of nurses, other health providers, and physicians—both physicians based on our campus as well as the important, large, and loyal cadre of community-based physicians who have for so long been a critical component of Mount Sinai. Only such a joint effort will yield what we have long sought, New York City's first 21st-century hospital.

Our second goal is the substantial expansion, within the next 2–4 years, of our research capacity—an expansion which will productively incorporate the best of the new biology. We face the challenge of leading New York City's biomedical research capacity back to its former glory and primacy. We must develop new laboratory facilities and an aggressive recruitment plan to enhance and renew our excellent scientific faculty. We seek to honor our absolutely unswerving commitment to scientific excellence with careful choices that both leverage our current strengths and include key emerging new areas of inquiry. We will not lose sight of the fact that the ultimate solution to improving health lies in robust research.

Third, we must remodel our educational programs to keep pace with society's needs. In our medical school we should stop trying to cram seemingly limitless amounts of new information into the crevices of an already clogged curriculum, but rather focus on building an excellent scientific base and sure-footed competence in clinical skills. Our students should develop the ability to constantly renew their own knowledge base—which will permit them to continue to learn throughout their careers and thus to continue to provide quality care in the sure-to-be rapidly changing medical environment of the 21st century.

On the postdoctoral level, it is time that we began to turn away from selfish superspecialist programs that often serve only limited academic efforts. We must begin to enhance training in underserved primary care and related areas. Reductions in the size of postdoctoral training programs in major academic health centers are painful and difficult to accomplish. But this is one part of the bill that society, or at least Congress, has clearly indicated it is no longer willing to pay, and progressive reductions in the funds available for graduate medical education will force reorientation toward areas of the greatest immediate need.

Lastly, we must rapidly expand our commitment to New York. The days of the isolated, introspective ivory tower are over. Academic health centers have major responsibilities to serve not only the broadest society but also the local community. Despite the marked limitations placed by our current fiscal constraints, we must provide access to high-quality care for all New Yorkers and fully integrate research and educational programs into Mount Sinai's partnership with the community. For within the shadow of this building are areas festering with poverty, crack, adolescent pregnancy, illiteracy, malnutrition, acquired immune deficiency syndrome, and a silent multitude of lonely, frightened, frail, sick old people. In our effort to break the cycle of disadvantage, we will not launch a broad haphazard salvo of short-term glossy programs, but an authentic effort—an integrated set of specific, carefully sculpted, well-targeted initiatives designed to take advantage of Mount Sinai's strengths while serving New York's critical needs.

We will bolster and sustain our recently mounted major initiative against acquired immune deficiency syndrome. We have quality research, education, and clinical programs in place and they will be augmented and linked more closely together in a coordinated effort that will become a major part of New York City's offensive against the epidemic.

We are about to launch a major effort to serve the health care needs of older New Yorkers. There are already over a million elderly people living in New York City. In the area surrounding Mount Sinai, 30% of the elderly live in poverty and 38% live alone. Mount Sinai is perhaps better positioned than any academic health center in the United States to take the lead in developing the new knowledge, the clinical programs, and the training capacity needed to respond to the emerging epidemic of frailty and dependence. We can no longer deny the simple fact that previously unimagined numbers of individuals are going to be old and sick in New York and throughout America.

This is a full, challenging, and expensive agenda which comes at a time when we are fatigued from the efforts of rebuilding our physical plant and threatened by severe financial constraints. But it is critical that we move on, for time is short and the consequences of inaction are grave for Mount Sinai and, I believe, for New York.

This ambitious agenda is not a fantasy—it is not a dream—I am not a dreamer. The Mount Sinai Medical Center I have described is within our reach. The resources needed to reach these goals—the scientific, clinical, educational, managerial, and private philanthropic resources—are in this room today.

What we must do, if we are to succeed, is to each step back a bit from our own agenda and join together in a common sustained effort to prepare the Mount Sinai Medical Center for the next century.

I am honored and privileged to lead Mount Sinai during this challenging and critical time in our history.

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THE
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OLUME 56 NUMBER 6 NOVEMBER 1989

Social Implications of Health Care in Contemporary Perspectives: Essays in Honor of Helen Rehr

Gary Rosenberg and Bess Dana, editors

From the Department of Community Medicine (Social Work), Mount Sinai Medical Center

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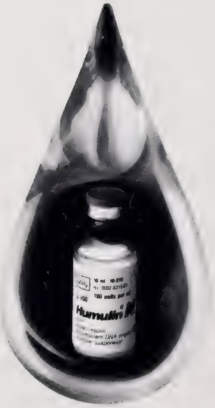

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CONTENTS

SOCIAL IMPLICATIONS OF HEALTH CARE IN CONTEMPORARY PERSPECTIVES: ESSAYS IN HONOR OF HELEN REHR

Gary Rosenberg and Bess Dana, editors

Foreword *Gary Rosenberg and Bess Dana* 427

A Model for Leadership in Administrative Practice *W. June Simmons and Neena B. Bixby* 429

Quality Care Assurance *Claudia J. Coulton* 435

Confronting the Challenge of Computerization for Social Workers in Health Care Settings *Irwin Epstein and Elizabeth Mutschler* 440

An Economist Looks at the Future of Health Policy *Charlotte Muller* 447

Patient Compliance with Therapeutic Advice: A Modern View *Robert H. Fletcher* 453

Social Work: An Important Component of Community Medicine at the Mount Sinai School of Medicine *Samuel J. Bosch and Kurt W. Deuschle* 459

Education for Health Social Work Practice: Reconciling Past, Present, and Future *Thomas O. Carlton* 468

Reflections on Community Health Education: A Program That Is Working *Michael A. Carrera* 472

Indicators of Social Risk for Poor Adjustment to Nursing Home Placement *Michael Mulvihill, Andrea Block Reshen, and Ming-Ann Hsu* 478

Social Well-Being: The Future of the Social and Health Care Systems *Karen Orloff Kaplan* 483

Can Ethics Be Taught? An Essay *Edmund P. Pellegrino* 490

Subject, Author, and Title Index to Volume 56 497

List of *Journal* Reviewers in 1989 503

Index to Advertisers

Eli Lilly and Company **cover 2**

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Foreword

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Social Implications of Health Care in Contemporary Perspectives: Essays in Honor of Helen Rehr

In 1905, Dr. Richard Cabot, Physician to Outpatients at Boston's Massachusetts General Hospital, initiated the practice of employing social workers as staff members of general hospitals. One year later, the Department of Social Work Services was established as an integral component of the services provided by The Mount Sinai Hospital. The present relationship of social work to the Mount Sinai Medical Center thus builds on a long-standing tradition of partnership with physicians and other health-care providers in the delivery of high-quality health and medical care services to individuals, families, and communities.

Over the years, The Mount Sinai Hospital has grown and developed from a community hospital serving the needs of the sick poor among New York's Jewish population to a major academic medical center whose responsibilities encompass the three interrelated functions through which academic medical institutions express their particular mandate from society: service, education, and research. The Department of Social Work Services has both contributed to and benefitted from Mount Sinai's attainments of the rights and responsibilities inherent in academic status. Its active participation in the process of institutional growth and change has served as a stimulus for broadening the scope and strategies for the organization and delivery of social work services, developing social work's research capabilities, expanding the reach and effectiveness of social work's engagement in professional education and its interprofessional and interdepartmental relationships.

In 1967, three years after the chartering of the Mount Sinai School of Medicine by the New York State Board of Regents, the final step in Mount Sinai's achievement of official membership in the academic community, a Division of Social Work was created within the medical school's newly established Department of Community Medicine. In 1968, the year the medical school opened its doors to students, the Edith J. Baerwald Professorship of Community Medicine (Social Work) was endowed by Jane and Jack Aron, members of Mount Sinai's Board of Directors and long-time social work advocates. The first such endowed chair in a United States medical school, this professorship recognizes the essential contribution of social work to the mission and functions of the medical school. It is thus a testimony to the past achievements of social work and a vehicle for ensuring its ongoing participation in the growth and development of the Mount Sinai Medical Center as a social health institution.

Dr. Helen Rehr joined the staff of the Department of Social Work Services as associate director in 1954, the year that formal planning for establishment of a medical school under Mount Sinai's auspices was initiated by a small board-appointed committee composed of key representatives of the hospital's lay and professional leadership. Her appointment reflects the professional wisdom and vision of the late Doris Siegel, then the Department's director of social work services, and in subsequent years the first Edith J. Baerwald Professor, in selecting a young woman of Helen's particular blend of social commitment and capacity for creative thinking and doing, to share in the responsibilities of converting the rich legacy from social work's past into the professional knowledge and skills needed for addressing the changing social health problems and possibilities of the present and future. Throughout her career at Mount Sinai, Helen has continued to play a seminal role in the developmental history of social work's relationship to the Mount Sinai Medical Center and the larger health care universe as it has evolved in 35 years of rapidly accelerating scientific, technological, and social change.

Helen's deep commitment to lifetime learning as an essential demand of membership in the academic community, her demonstrated ability to learn from and with an ever-growing number of health-care consumers and providers, have enabled her to make Mount Sinai her professional home without confining her to the same institutional responsibilities or stifling her creative capacities. Within Mount Sinai, her continuing growth and development have been acknowledged in many tangible ways: her succession to the positions of director of social work services in 1973 and Edith J. Baerwald Professor in 1974, following Doris Siegel's untimely death in 1971; her selection as a member of our Medical Center's Community Board, the Medical School's Admissions Committee, and various institutional search committees; her achievement of Professor Emerita status on her decision to take early retirement in 1986; and—perhaps of most significance to the ongoing development of social work in health care—her present appointment as consultant to the Department of Social Work Services, which enables her to influence a new generation of social workers and to develop social work initiatives in research, education, and practice.

Her curriculum vitae also records her ascendency to a position of leadership in local, national, and international health affairs. Her contributions to the development of hospital-based social work services have earned her the prestigious Ida M. Cannon Award of the Society for Hospital Social Work Directors.

Her contributions to the growth and development of social work as a profession have won her election to the recently created Academy of Social Work Practice. Her influence on the advancement of social work knowledge and the quality of professional education has also been rewarded by her election to the Hall of Fame of Hunter College, her alma mater. She continues to serve as a member of local and national agency and foundation boards and the Commission of Quality Care Assurance of the American Hospital Association. She is a much-sought speaker at professional meetings and program consultant, and the quality of her contributions to the professional literature has made her one of the most frequently cited authors in social work in health care today.

Helen's own estimate of her professional worth, however, does not rely on these time-honored ways in which institutions and professions recognize and reward their leaders. As one of social work's best friends and most objective critics, she derives her sense of professional achievement from the expression of her investment in promoting the circular relationship among practice, research, and education in social work's ongoing contributions to the enhancement of the human condition.

It is therefore most fitting that the papers selected for inclusion in this issue of *The Mount Sinai Journal,* honoring Helen's special contributions to Mount Sinai and to the field of social work at home and abroad, represent areas of her particular interest. They honor the work of Helen Rehr and, like her, reinforce and strengthen the connection between social work and health care.

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A Model for Leadership in Administrative Practice

W. JUNE SIMMONS, LCSW, AND NEENA B. BIXBY, LCSW

In times of plenty and in times of want, the role of the social work agency administrator is constant—to secure and deploy resources to effectively address the most pressing social problems and at-risk populations. The social context, priorities, nature, and extent of funding continue to evolve and change. But always the agency must adapt its services and the understanding of its purpose to changing needs and resources and developing clinical and social knowledge.

This article addresses some key leadership concepts for social work administrators that are essential to the promotion and support of excellent social work practice. The focus includes examination of methods for creating work environments conducive to the development of responsive and innovative social work services. The business literature developed to encourage the "pursuit of excellence" is a valuable adjunct to this task, and this article draws from that body of literature, with discussion, applications, and illustrations from social work health practice settings.

The Shift from Management to Leadership

Social work has attempted to strengthen agency systems in recent decades by learning from business systems and strengthening business skills. There has been a growing emphasis on accountability and on productivity enhancement and its measurement, and a focus on expansion of agency size and resources. Now new approaches have become available from insights developed in the business world that are even more compatible with social work than those previously borrowed and applied. Today the understanding of essential administrative skills is moving to incorporate and elevate leadership skills to a level of major importance. Excellent administration is a balanced blend of management skills and leadership ability that mobilizes people in systems to do good work and enjoy the process. The capacity to develop and sustain a constructive "work family" is vital to the ongoing evolution of relevant and high-quality services.

Leadership

Leadership is often thought of as charisma—a personal capacity to inspire effort in others. Although charisma is, of course, beneficial and aids positive performance, it is not essential. What is essential is to have a clear grasp of the conceptual base underlying the elements of the leadership task and to begin to build skills and methods for implementing them. Leadership is something that can be taught and learned. Although leadership style may be an individual matter framed to some extent by individual values and personality, there is a knowledge base and a set of skills which, if conceptualized and clarified, are transmittable.

The premise of this article is that the social work administrator is responsible for more than the physical resources, the financial base, the business systems, and the program definitions of the agency or department. The leadership role of the administrator is focused quite directly on the human resources within the social work operation as well as on the organizational contexts in which it operates. The focus is not so much on tasks as on mission, and on the quality of the effort put forth toward its achievement.

Tom Peters, in his early book *In Search of*

From Huntington Memorial Hospital, Senior Care Network, 837 South Fair Oaks Avenue, Pasadena, CA 91105. Address reprint requests to W. June Simmons, Associate Administrator and Director, Senior Care Network, or Neena B. Bixby, Chief of Patient Services, at that address.

Excellence, defines leadership as an effort "organized to obtain extraordinary effort from ordinary human beings" (1, page 81). In other words, it is designed to lift work from a mundane to an artistic level. The intent is to focus on striving toward excellence, always growing, changing, and adapting to find better ways to achieve the goals of the organization. The leadership effort focuses on the creation of a sensible environment in which people can produce well and continue their professional development. Such an environment consists of

- a meaningful purpose;
- a sense of immediate direction within that broader purpose;
- a recognition of the individual contribution to the team effort;
- permission to change things that need changing; and
- organization-wide confidence that there is fairness and equity in opportunities and rewards for all.

For the sake of differentiating the concept of management from leadership, it can be said that management focuses on operating the organization, whereas leadership focuses on giving the effort purpose, meaning, and excitement. Peters speaks of "transforming leadership" (1, page 48), which addresses the common human need for meaning; the basic tendency to be lulled by the status quo must be balanced by an infusion of ideas and ways of working that create a sense of importance and excitement about tasks over time. It is easy for people to be motivated and energetic when they enter a system. The challenge is to inspire an ongoing sense of newness, intense involvement, focus on high-quality outcomes, and learning. As discussed in Peters, the leader needs to "enable followers to transcend daily affairs" (1, page 83).

A Conceptual Framework for Leadership

Leadership is enhanced when the effort to develop leadership skills occurs within a conceptual framework. Hickman and Silva (2) have developed an approach that is most applicable to and value-congruent with the social work setting. They point out that the leader, in order to guide the building of a winning team effort, must work in three essential areas: vision, culture, and strategy.

Vision. Creating a "vision" as an essential element of the leadership process is a natural starting point. As the keeper of the whole, as the person responsible for tending to the health, sense of cohesion, and direction of the organization that does the work, the leader has the key task of developing and articulating a vision that guides the efforts of all. The creation of a vision means the definition and communication of a compelling dream that gives meaning to the effort day after day. This entails the delineation of needed progress—a clear picture of how things ought to be in the best of all possible worlds. It also requires an ability to assist others to see a new, better, and unknown reality based on the present situation. The vision can be large or small, but it must be both general and concrete, that is, defined so that people understand not only what the effort is leading to in the long run, but also what steps are needed in the present to move in that direction.

This idea is exemplified in the world of athletics, where the vision of victory compels enduring and intense efforts in practicing and strategizing in order to ultimately win in the competitive arena. A coach, for example, assists a team to envision itself as winning a national title and, at the same time, assists the team and its members in all the specific approaches to particular plays and events. In social work practice this takes the form of the ability to focus professional energy on the purpose and hopes of the agency. In this context, development of new services for populations with emerging needs can occur quite naturally, as can development of new methods of service. In many settings across the country, specialty services were developed for such populations as the aging and victims of sexual assault and of domestic violence. These populations were previously undifferentiated as specialty groups. Then someone stepped forward and identified them in a new way and mobilized others around the development and implementation of more appropriately defined, designed, and delivered services for these groups. Such program innovations most commonly occur through a visionary agency leader with a view of social work practice as evolving and unfolding and of social work knowledge, skills, and methods as developing and changing in light of new insight and understanding.

Vision, then, can deal with programmatic and service-definition issues. It can also incorporate other aspects of agency life. For example, the leader's vision ultimately defines what is expected and desirable in the setting. This relates to methods of internal work and also to relationships with outside entities. Part of what the leader must develop and articulate is the formation of a culture for the organization's work "family" and the strategies for achieving the mutual vision.

A compelling vision has certain characteristics that give it life and force. First, as the word *vision* suggests, it must be "visualizable," something that can be seen clearly in the mind's eye. In the athletic arena, the winning team sees itself at the victory stand. Being able to "see" the outcome of an effort greatly enhances the capacity to implement it.

Second, it must strike at the emotional level—it cannot be just cognitive. An example of an effort that is easy to visualize and is emotionally satisfying is the move by many agencies in a variety of settings toward coordinating care across existing service delivery systems through case management. This is a broad and sweeping service concept that, to some extent, reframes practice. It represents a significant improvement in work methods while addressing service quality and professional delivery of care.

Third, the vision must be stable and enduring, yet capable of change and adaptation. The vision must set the direction in which the effort drives, but it must not limit the ability of those involved to modify the methods and approaches and nuances of the dream. If the dream is the establishment of a coordinated system for individual and community services, it must allow for a variety of methods for putting that dream into operation in the light of real experience. The dream must not be so binding as to narrow the effort to do things in a rational and logical way from day to day.

Finally, the vision must focus on quality, not size. The focus is on the pursuit of excellence, not on growth in resources. A vision might even narrow the scope of an organization or refine its clinical focus. As Quinn (3) suggests, "We have slowly discovered that our most effective goal is *to be best* at certain things. We now try to get our people to work out what these things should be, how to define best objectively, and how to become best in our selected spheres. You would be surprised at how motivating that can be." This idea is perhaps best summarized by Bennis and Nanus in their book *Leaders* (4):

> Leaders articulate and define what has previously remained implicit or unsaid; then they invent images, metaphors, and models that provide a focus for new attention. By so doing, they consolidate or challenge prevailing wisdom. In short, an essential factor in leadership is the capacity to influence and organize meaning for the members of the organization.

It is not enough to simply develop and articulate a vision. As Peters (5) states, "Developing a vision and, more important, living it vigorously are essential elements of leadership." A leader must be prepared to do this in both word and action repeatedly; otherwise, the effort tends to drift into a status quo and the greater vision is lost. People are easily distracted by daily affairs and can feel oppressed and overwhelmed by difficult challenges. The vision is most valuable if the leader continues to "play it," much as a musical composition only has true value when it is performed or enjoyed. Left in silence it ceases to have impact and is quickly forgotten.

Culture. The second essential element of the leadership practice arena is the building and maintenance of a positive and constructive culture within the organization. All human groups have cultures, whether they be nations, social organizations or work groups. In work settings these organizational cultures are subject to influence and planned guidance. This is not unlike a family structure which can be modified through positive intervention over time to create a more constructive group. The elements of the culture include

- shared values;
- accepted methods;
- decision-making style;
- communication systems; and
- history.

The leader's vision of the organization must include more than a service definition and a set of concepts about the relationship of the social work program to its organizational context—it must also define the culture. The focus must be on both the programmatic and the human-community elements that the work environment represents. The traditional management view of administration does not encourage or suggest attention to the quality of relationships and the nature of the professional interface among colleagues, which is in itself an essential component of agency vision. Instead of the focus on formal objectives and business systems, it is here suggested that the relationships among staff must be tended to, understood, nurtured, and guided toward the achievement and maintenance of a constructive and creative interface.

The job of the leader is to build a social work culture of excellence. This is a multifaceted task. It begins with staff selection, but also includes methods for motivating, rewarding, retaining, and unifying good staff. The leader creates the atmosphere and both models and reinforces the desired values. The leader determines what behaviors are expected as desirable in staff relationships within the agency.

Some of the elements of a strong positive social work culture that is dedicated to supporting staff efforts to do excellent work include optimism, persistence, fairness and reliability, timely and responsive feedback, and reciprocity. These fundamental values and orientations can create a positive environment which is energizing to the professional endeavor and represents a positive moral force for healthful living. While these postures and methods are easily articulated, their actual introduction, establishment, and maintenance in the work environment require vigilant effort.

Optimism is vital, since a sense of helplessness quickly discourages human endeavor. Modeling of optimism is critically important. Continuous articulation of the vision and the need for hope, coupled with the ability to reframe discouraging realities into opportunities and challenges, is essential. The leader's job is not only to encourage optimism, but to demonstrate it and foster it in others through a variety of assistive interventions. Clearly, the leader's actions speak louder than words in this regard.

Persistence in problem-solving efforts is a critical feature of building a culture of excellence for social work practice. Too often a social worker will persist with clients, comfortable in accepting the difficulties of the client and understanding that resolution and development of new ways of living require time and repetitive intervention, yet will give up after just one comment or suggestion on improving things in the work environment. The notion of persistence in bringing forward new ideas or suggestions requires the ability to listen carefully for nuances of needed change and a conscious and explicit articulation of the importance of multiple efforts to achieve change in the setting. At least as important is evidence of the leader's own perseverance in demonstrating strong and positive advocacy to obtain appropriate resources and role definitions for the program effort within the host organization or community context. Again, modeling is a critical leadership element in building a positive culture, and persistence is vital.

Fairness and reliability are crucial in the leader. Again, these values must be made explicit, must be articulated and demonstrated clearly. This area of leadership includes identifying instances of unfairness, unreliability, or other damaging behaviors, in staff members themselves or in the environment, and managing these swiftly and effectively. Praise and reinforcement of positive behaviors is important and helps to build and promote positive efforts by the staff. But failure to maintain boundaries and appropriate role definitions, and inability to manage backbiting and destructive staff relationships are both lethal to the culture. Common direct articulation of problems and holding people fully accountable to behave constructively with each other in the work setting is a challenging and emotionally demanding effort. Such efforts, however, are evidence of the excellent leader's culture-building activities.

Timely and responsive feedback is also an important aspect of quality in the work culture. Staff members who make significant contributions toward achieving special outcomes in the work setting must receive timely and responsive feedback, both positive and negative. Behaviors that are exceptional deserve recognition and celebration. Behaviors that are consistent and steady also require acknowledgment and credit. And behaviors that are hurtful or withholding, or in some manner harm the operation of the team in its work or in its interrelationships, must be identified, faced, and solved immediately. Otherwise, those who try hard are discouraged, and the joy of the excellent effort is diminished.

Underlying the concept of reciprocity and the effort to build a strong community of equals is the assumption that staff members are adults who deserve a reasonable degree of autonomy and whose opinions should be respected. This belief lies at the heart of a constructive, interactive, and collaborative system designed to benefit from the insights and observations of all its members. Yet this does not obviate the fact that even constructive adults can engage in damaging behaviors, either accidentally or purposefully; such behavior must be managed swiftly to demonstrate that justice and fair play will prevail.

What is suggested here is a high level of introspection and conceptual development in an interactive process with changing organizational settings for the delivery of social work services. It is a fascinating inquiry and a valuable contribution to the evolution of supportive and productive service delivery systems that are healthful for participants. But these are not achievements easily accomplished by individuals. Thus, a premise of this work is that collaboration with both staff and outside colleagues is an instrumental method for achieving optimum outcomes.

Because leadership is often viewed in heroic proportions, there is a tendency to drape individual leaders in heroic expectations. But the key skills are rather the ability to listen, to synergize and to encourage strong and effective collaborative dialogue, and then to synthesize it into meaningful administrative and leadership insights. The ability to garner information, to facilitate interaction between many individuals having different perspectives, and to assure the development of cohesive and clearly articulated conclusions from that dialogue characterize superior leadership. But these are best done in concert, not in isolation.

The culture-binding obligation centers on a growth perspective. This model is an evolutionary one that assumes the need for continual development, change, and adaptation because the finished product is never reached. The context and the times change, the players change, knowledge and insight unfold and develop, and new interests emerge. Thus, organizational responses to the environment must be flexible to be appropriate to change and must acknowledge the ongoing process of the evolution of a quality-focused professional endeavor that benefits the clients served, the staff members that deliver the services, the host agency in which the services occur, and the community in which they all function.

The evolution must be of the whole, not just of the parts. Development of teams within larger settings and development of individuals within all settings are important. These continuing development efforts are what lend excitement and purpose to the effort. No one who enters a job in a professional setting, be they secretary or social worker, does so to have a boring, redundant, repetitive job. They do so out of a sense of mission, a desire to help their fellow human beings and a wish to make a difference through their life's efforts. But this lofty purpose cannot persist in a stagnant environment. The individuals in the system must be encouraged to identify need for change, to create their own visions about a better tomorrow, and to move things forward as part of the team effort.

Strategy. The concept of strategy, the third arena of leadership activity, is defined by Hickman and Silva (4) as "locating, attracting and holding customers." The "customers" for the social work leader include all of the key decisionmakers in the host organization, physicians, nurses and other professionals who constitute the referral bases and collaborators for quality patient care, clients (those who will be willing to make use of the services), and the social work staff members who are the key constituency of the department administrator in achieving effective agency practice.

Development of strategy focuses on building a funding base and referral networks for well-targeted services that are coupled with broad sanction and support for specified roles and tasks. This kind of strategic focus is a fundamental leadership attribute that is used to move from the present reality toward a chosen vision of the future. It is the selected itinerary and vehicle or methodology.

Hickman and Silva (4) delineate three achievements or outcomes of actions based on strategic thinking: (a) effectively satisfy customer need; (b) gain a sustainable advantage over competitors; and (c) capitalize on company strengths. Applied to the social work setting, these are indeed instructive guidelines.

Part of the leader's job is to continue to negotiate for key departmental resources: roles and turf, funding, basic tools (phones, computers, space), and community resources. If "customer need" reflects the needs of the organization that provides funding, the professional aspirations of the social work staff, the service needs of clients, and the convenience and integrity needs of the referral sources for relevant and quality resources, there is a multifaceted set of "customers" to satisfy. It is vitally important that the strategic leader identify the primary needs of these customer groups and direct planning efforts to demonstrate the value of the social work operation in meeting the most pressing concerns and needs of each.

One example of how changing "customer needs" are identified and met is the current strengthened interest in discharge planning in social work departments. As hospitals and insurers intensify their need to control length of stay, departments have made the function of discharge planning more visible. This approach of "marketing" social work services based on changing hospital needs is also illustrated by the many social work leaders across the country who are involved in efforts to continue needed funding to retain a social work presence in the institution. There are a variety of reasons why social work is a desirable presence. For instance, many departments direct employee assistance programs, which are "marketed" based on their ability to save the organization money, or reduce staff turnover, or optimize productivity.

The previously alien business concept of gaining a "sustainable advantage over competitors" has become increasingly relevant to social work practice in hospitals as other disciplines seek to seize our roles. The wisdom of social work direction of discharge planning and case management programs for the frail elderly and disabled adults requires appropriate articulation as others seek to claim these management roles. Constant investments in assuring adequate understanding of the unique and valuable contribution of social work as it relates to primary felt needs of decision makers in the host setting or outside funding sources is critical here. Continued demonstration of excellence in practice to retain physician and line-nursing support is also vital.

The notion of "capitalizing on company strengths" is a comforting one. It would support the discussion above, suggesting that the social work contribution has value to a variety of constituencies which can be translated in many ways. The best survival strategy for building excellence within the department and maximizing resources and support from external parties is to develop high-quality practice along with a compelling rationale for the design and purpose of clinical services in a given work setting. It is crucial to demonstrate and clarify the value of such practice to all who provide essential resources, be it financial support, role definitions, or access to clients.

Conclusion

To summarize, leadership is an essential component of successful administrative practice. It is an area in which practice skills should be developed and refined. This conceptual framework of three broad arenas into which these practice endeavors fall can assist considerably in this vital component of social work practice.

Leadership in the work setting occurs in a community of equals and is best viewed as a consensus-building task among colleagues. What distinguishes leaders is not that they are necessarily more remarkable than other participants, but that their role requires them to tend to the whole, while other team members focus on their individual parts. One good analogy is to the role of a coach of a baseball team—the coach need not be the best baseball player. But if the coach has galvanized the efforts of numerous stars into a winning group whose performance is cohesive and excellent in multiple aspects, the coach deserves—and often receives—great acclaim.

Though the work setting is a community of equals, the coach must exercise authority. Authority is usually thought of as being exercised by one with greater power and higher quality than others. This notion is inaccurate and must be discarded. What occurs is that a community of equals contains individuals with differing strengths and contributions. And in that context the "coach" has an obligation to set limits, give assignments, identify and articulate areas of performance in other team members that require improvement, and suggest possible new aspirations for individual members of the team. This is rather like the orchestra conductor, who often receives great respect and acclaim for the ability to mobilize the efforts of a group of spectacularly talented and accomplished individual performers and blend them into an ensemble performance of great proportion.

Social work agency practice can be viewed within this artistic and developmental framework as continuously striving to achieve higher levels of quality service and to build service systems that are responsive to new populations and new clinical insights. Social work systems must be carefully tailored to support quality performance by the individual professionals within them. This requires sensitive listening to the daily experience of those professionals in order to work together to identify needed changes and adaptations to a constantly changing context.

This level of interactive collaboration and positive evolutionary focus is easier to describe than to accomplish. But the intention to achieve such a model of agency life as a base for quality agency practice is in itself inherently worthwhile and supportive to the constructive agency system.

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Quality Care Assurance

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Quality has supplanted cost as the driving ideology in health care today. That consumers and providers alike want their health care to be of the highest quality is indisputable. Receiving and giving quality care taps into the deepest hopes and fears of patients and their caregivers. Yet quality, like other abstract and value-laden concepts, can deteriorate into slogans and marketing cliches. Quality assurance can become a bureaucratic paper shuffle or a despised alien force.

In some ways, the prominence of quality in the current health care debates places tremendous burdens on quality assurance methodologies. They are moving increasingly into the limelight and more definitive and conclusive information is being demanded. Tension is mounting in the relationship between quality assessment and practice. There is risk of a misleading disjuncture between the refinement of the methods and the public's demand for information.

Yet quality assurance has made tremendous strides in its short history and can draw on a wealth of resources to address some of the pressing issues of the day. This article reviews developments in quality assurance over the past two decades and examines the current trends. In keeping with the social health focus of this volume, many issues selected for illustrative purposes pertain to psychosocial aspects of health or broader social health policy.

Historical Overview: From Case-Based to Statistical Models

Cost and quality have been constant companions, and it was in fact government efforts to control cost that provided an important impetus for quality assurance programs as we now know them. The 1972 legislation that created the professional standards review organizations (PSROs) was largely directed toward limiting costs through utilization review but did include requirements for limited quality assessment through what were called medical care evaluation studies and profile analyses (1). Although this legislation engendered years of debate, by 1978 most hospitals had created structures and processes for conducting the required reviews and studies. Quality assurance programs were further defined by the Joint Commission on Hospital Accreditation (2).

These programs seemed to assume that both costs and quality could be controlled through professional review of individual cases using either implicit or explicit professionally determined criteria. Two of the key distinctions of this quality assurance era, in contrast to the current one, were the reliance on individual professional judgment and the focus on whether the overall care given to individual patients was consistent with prevailing standards of practice. In other words, poor quality and overutilization were to be identified in specific cases leading to some overall judgments about hospital performance and, if necessary, denials of payment. The process of reviewing cases and correcting problems was expected to lead to overall improvement in quality of care.

The implementation of this type of quality assurance spread widely and included most professional groups in health care, including social workers (3, 4). An important benefit, especially of the medical audit and peer review activities, was the articulation and examination of standards of practice. However, a weakness was that, although audit and feedback had the potential to improve care for those patients studied, they

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gave no assurance of reaching the entire at-risk population.

The decade of the 1980s brought important shifts in quality assurance, an influential factor again being costs. Case-specific utilization review proved disappointing in its ability to contain the growing public expenditures on hospital care. So it was not surprising that the Tax Equity and Fiscal Responsibility Act of 1982 was the location for legislation that would have a major effect on quality assurance. This act called for the development of a prospective payment system for hospitals, later implemented in the form of diagnostic-related groupings (DRGs) as the basis for fixed payments, and replacement of the PSROs with peer review organizations (PROs).

With the advent of DRGs it was no longer necessary to externally mandate utilization review. Hospitals were forced to control utilization to prevent their overall costs from exceeding the revenue generated by the fixed payments. What was needed from the PROs were reviews to prevent hospitals from manipulating the DRG systems or succumbing to the temptation to cut costs to a point where quality would deteriorate.

A technological advance of the 1980s—the growing capacity of large data management systems to merge clinical and cost data—made these developments in quality assurance and cost control feasible. These innovations made possible the creation and implementation of the DRGs. They also allowed the determination of statistical norms for patient care and outcomes and, thereby, the detection of outliers. Indicators of quality such as readmissions, complications, and death rates could be routinely examined for entire populations, and problematic patterns could be flagged and investigated.

The two decades of quality assurance have seen a movement from primary reliance on professional judgment and individual case review to a population focus and dependence on statistical analyses for the detection of possible changes in quality. The care provided to individual patients has largely become the data for investigating and solving problems that are suggested by statistical studies. This rapid change from a clinical to an epidemiologic perspective poses many practical and conceptual difficulties for health professionals.

Current Models of Quality Assurance

Present approaches to quality assurance have been shaped by the historical events, by health professionals and researchers concerned with conceptual and methodological questions, and by the accreditation process, most notably the work of the Joint Commission on Accreditation of Health Care Organizations. There is longstanding agreement that quality has three components: structure, the adequacy of human and physical resources and organizational arrangements; process, the degree to which accepted procedures and methods are followed; and outcome, the level of results (5). These components are interrelated in that the best possible results for patients will occur when the proper care is provided in an organization with adequate physical and human resources and effective organizational systems. The social health model requires looking beyond the four walls of the institution to add access as a component of quality. Institutional and financial barriers to receiving appropriate acute and long-term care also have important effects on the quality of patient outcomes.

Today's models of quality assurance begin with the assumption that providers are responsible for the quality of the entire scope of care they claim to provide or are obligated to provide. Quality assurance activities must have the potential to influence that entire scope of care and all of the patients receiving that care. These effects may occur indirectly as well as through direct evaluation.

The power of statistical analyses and database management makes this mandate to reach all care more achievable than were earlier case-based methods. Providers develop a set of clinical indicators that are signs of the appropriateness of care or the quality of the process or outcome. These indicators are not necessarily direct or perfect measures of quality but are observable signals that are sensitive to changes in quality of care. For example, early readmission to the hospital may serve as a warning that discharge plans may have been incomplete. Because of the many other factors affecting readmission and the imperfect correlation between discharge planning and adequate posthospital care, this indicator is only a signal with a recognized margin of error.

The clinical indicators, with their admitted imperfections, are measured continuously, and periodic comparisons are made between the institution's performance on the indicator and some agreed-upon expectation or statistical norm. Departures from the expectation are analyzed to determine the underlying deficiencies, if any, that they reflect. Where problems in quality are uncovered, corrective action is taken.

Several aspects of this model, which centers on statistical monitoring of key indicators, often trouble clinicians.

Statistical "Quality" and Margins of Error. At the core of their difficulty may be that clinicians tend to think of causality in ideographic terms; that is, they rely on the complex set of conditions and characteristics presented by the individual patient to understand the prognosis or anticipated outcome. Their thinking is deterministic in that the outcome can be understood as a function of these factors in the particular case. Error, or inability to predict the outcome, is viewed as a function of inadequate or incomplete understanding of the phenomenon in this case.

Statistical models, on the other hand, are based on laws of probability. Error is assumed to be random and represents the fact that a given set of explanatory factors are never perfect predictors across groups of individuals because of the enormous range of sources of individual variation. Thus, quality indicators, in a statistical model, are correlates of quality but are accompanied by considerable error and may not be indicative of quality in any particular case. For this reason, when statistical models are used to study quality, there is the recognition that the findings are only estimates of quality and that these findings are subject to a margin of error.

Risk Adjustment. Another important aspect of statistical monitoring that does not so clearly arise in case-based approaches to quality assurance is risk adjustment. Statistical trends in quality indicators can be affected by changes in either the process of care or the characteristics of the patient population. In other words, the proper expectation for an indicator, such as readmission rate, will depend upon the severity of illness and social health risk factors of the patient. Therefore, statistical monitoring systems attempt to include a method of adjusting for the degree of risk factors.

Risk adjustment involves statistically removing the effects of these factors so that change in quality can be observed without the contaminating effect of change in risk. The results of risk adjustment are similar to what was achieved in case-based audit methods by removing cases that were considered "exceptions." Exceptions were cases that could not be expected to meet an outcome or process standard and were, therefore, not included in calculations of quality.

Toward Uniform Data. The Joint Commission and many professional organizations are working toward achieving consensus on key indicators within specific groups of clinicians. This would allow for some uniformity across institutions, since the ultimate demand from the public seems to be for access to comparative information about hospital quality. The success of this effort depends heavily on uniform and reliable methods of data collection and the development of sensitive risk adjustment indices.

Quality Assurance Challenges for the Future

The changing place of acute care in the health care system, advances in medical technology, growing demand for an informed consumer, and rising costs amidst finite resources all pose challenges to quality assurance. These issues must be addressed if quality assurance is to achieve its promise.

Changes in Acute Care. Much of the development of quality assurance models and methods has occurred within the acute-care hospital setting. The focus of most programs is the care received by inpatients while they are hospitalized. Declining lengths of stay and growing reliance on preadmission testing and outpatient treatment and surgery make this focus less and less adequate. Particularly when the concern is about the adequacy of social health care, the bulk of the serious problems in quality occur outside the hospital. Yet shifting responsibility for quality assurance beyond the institution poses many difficulties, not the least of which is fixing responsibility for the quality of care. New cross-institutional approaches to monitoring high-risk patients during transitions into and out of the hospital are needed and should have considerable patient benefit (6).

A related problem is that cost constraints apply differently to the acute-care setting than to services provided outside the hospital. Rehr has pointed out that in attempting to lower inpatient costs, a greater burden of care has been shifted to providers outside the hospital (7). A source of confusion for quality assurance in this area is that patients' inability to pay for services is viewed as an acceptable explanation for terminating care in the community, whereas failure to provide a needed service in the hospital would be considered poor quality care. Absolute outcome-based standards for quality of care outside the hospital will gain little acceptance under these circumstances. Yet it is this nonhospital part of the health care system that will have a growing effect on patient health and quality of life.

Improving Outcome Measures. Risk adjustment was mentioned above as an essential component of the statistical approach to monitoring quality. How to accomplish this adjustment accurately and with some degree of consensus is an important item on the quality assurance agenda. The greatest public attention to risk adjustment has occurred in response to the release by the Health Care Financing Administration of hospital-specific mortality rates for various types of Medicare patients. Hospitals have been understandably concerned that consumers would fail to take into account differences in the risk levels of patient populations. Efforts to measure severity of illness, while under development for many years, have gained increased importance as methods of adjusting quality comparisons across institutions (8). A recent study suggests that after adjusting for severity, hospitals with higher mortality rates may have more preventable deaths and deficiencies in process aspects of care than hospitals with lower mortality rates (9). The approach to risk adjustment in this case was complex, requiring record reviews and a combination of clinical and laboratory findings. Although the study demonstrates that risk adjustment is essential, considerable refinement is needed before such methods can be universally applied.

A social risk adjustment index is even further from the current reality. Outcomes that are affected by social risk factors require an index similar to that used to adjust for severity of illness. Some models have been developed for predicting who is at risk for posthospital care needs, and these could probably be adapted to form a general social health risk index (10). Considerable work is needed to determine whether the index is generalizable in various locations, since social risk is not determined by characteristics of the patient alone but also by the particular social and physical environment that surrounds the patient. Furthermore, the practical aspects of data collection on social risk require uniform definitions and data collection systems that are common across many facilities. The Hospital Social Work Information System developed under the auspices of the American Hospital Association's Society for Hospital Social Work Directors is an example of a system that has the capability to produce this uniformity (11).

Attaching proper values to various health care outcomes is another important issue as quality assurance relies more on outcome indicators. Currently, many quality assessments are based on whether predetermined outcomes defined by professionals are achieved in an acceptable number of cases. An example of this type of study is the comparison of relative mortality in various hospitals. In these studies, the value of the outcome is presumed to be equal in all cases. Whether this assumption is accurate is called into question when the desirability of the outcome is conceptualized from the point of view of patient preferences (12). Especially in the face of medical technology that can extend life even when patients are seriously ill, it cannot always be assumed that lower hospital mortality or other indicators of quality that may be selected by providers are valuable from the patient's point of view.

Outcome-based quality assurance could have unintended distorting effects on the health care system if questions of the relative value of outcomes are not taken into account. Proper valuation of outcomes requires methods of incorporating patient and public preferences into evaluations of quality. Two general approaches to this problem are possible. One approach is to compare individuals' preferences for treatment outcomes against their own actual treatment outcomes, including preferences for extended life, maintenance of functioning, symptom control, and institutionalization. The advantage of this approach is that it would maximize the fit between the idiosyncratic wishes of patients and what health care can actually achieve. The disadvantage is that it would be difficult to generalize across patients, since preferences may be shaped by irrational fears and strong emotions as well as more universal values. An individual focus would also make it difficult to educate providers about patient wishes in general, so that these wishes could be taken into account in treatment planning.

An alternative approach to valuing outcomes is to develop scales based on representative populations, so that values attached to different states of health could be represented in general. Several studies have shown this type of quantification to be possible (13). Such scales could be used to more properly weight various outcomes for general preferences. For example, a hospital that produced a lower death rate for acute respiratory failure but discharged many patients to nursing homes on ventilators might not be considered of higher quality than one with a higher inpatient mortality rate when these outcomes were weighted for generalized patient preferences.

Too often patient involvement in quality assessment has been conceptualized as patient satisfaction with process (14). In this regard, it is often accurately pointed out that patients are only in a position to evaluate some of the interpersonal and esthetic elements of care. Therefore, these evaluations have not been raised to high levels of importance. However, patient perceptions are probably more important in determining when and to what extent achievable outcomes are desirable and the role of subjectively determined aspects such as pain and suffering in the equation.

Cost vs. Quality. A final issue returns to the place this article began with: the interconnectedness of cost and quality. The question on the horizon seems to be, At what price quality? Complicating this question is the growing power of the purchasers of care and the tendency of large employers to become self-insured (15). When cost and quality controls come from the government, there are several sources of checks and balances, most importantly the political process through which constituency groups exert their influence. Purchasers, and related managed-care programs, are now positioned to influence the quality of care received by their employees through their contractual arrangements. Unlike government, which is vulnerable to a wide range of constituencies, these organizations are primarily accountable to employers, not employees and typically not health care professionals. Unquestionably, price will be a major factor in the plans' choices of providers and services, and the degree to which patient preferences and other aspects of quality will be taken into account is yet to be seen.

Quality assurance stands in a strategic position in the current health care environment. Its methods have grown in their power and sophistication and there is growing demand for the information it can produce. At the same time, the place where quality assurance has been most effective, the acute-care hospital, has less control over the real goal of quality, the health of the patient. Many of the benefits of hospitalization depend on care delivered before and after a hospital stay. The kinds of services and providers to whom the patient has access are under increasing control by payers and purchasers. And some of the outcomes hospitals can achieve, such as prolonging the life of terminally ill patients, may not be valued by everyone. To respond to these forces, quality assurance concepts and programs need to move beyond their focus on specific institutions and accept the health of populations as an appropriate purview for the next decade.

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Confronting the Challenge of Computerization for Social Workers in Health Care Settings

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Abstract

Computerization and information technology will profoundly affect the work of health care social workers in the coming years. This paper reviews recent trends in information technology in health care systems and their implications for social workers. It describes recent innovations in information systems designed specifically for social workers. It concludes with a review of recent studies of utilization of computer and information systems by social workers and from these derives some of the conditions that must be created if social workers are to effectively make use of this technology.

Of all the settings in which social workers are employed, health care organizations have probably sustained the deepest and broadest impact of computerization. Moreover, computerization is not the only major change taking place in health care delivery systems. Changing demographic trends, changing social attitudes toward health care, fiscal crises born of increased costs of health care, and new medical technologies are just some of the factors that are having an impact on these systems. These driving forces are complex and interactive. How health care social workers respond to this changing environment will significantly affect their own worklives and the lives of their patients.

Yet, like their social work colleagues in other fields of practice, many health care social workers view computerization in negative terms. Some, who are intimidated by computer technology and research methodology, perceive it as a threat to the "softer," nonroutine, more artistic and creative aspects of social work practice (1, 2). Others view it with suspicion as just another management device to increase efficiency, whatever its impact on effectiveness or service to patients. Still others fear a reduction in professional autonomy correlative with an increase in computer-assisted accountability systems.

Some of these fears are justified. So, for example, Conrad (3) has described the way implementation of a computerized foster care accountability system could lead to a displacement of the very goals it was set up to achieve. More generally, Grasso and Epstein (4) have argued that without extensive training for social workers in using computerized information systems, goal displacement is likely to result.

The authors of this paper do not dispute the fact that much of the management motivation behind computerization involves an effort to cut costs. In a time of severe budgetary constraint, this makes sense. Nonetheless, we contend that concern with practice effectiveness, quality of service for patients, and quality of worklife for workers is not inherently incompatible with concern about efficiency. However, in order to integrate these concerns within a computerized information system, the social workers who use it must be equipped with the requisite knowledge and skills. In addition, the organizational units that employ them must offer support structures, training systems, and reward structures that reinforce their proper utilization. Finally, the information systems themselves must be "practi-

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tioner-friendly" and provide timely, accurate, and interpretable practice-relevant information.

If these conditions are met, health care social workers have an opportunity to "capture" computer technology and use it for their patients and for their own professional advantage. In so doing, they can demonstrably maintain and improve their practice effectiveness as well as efficiency. Ideally, this will increase their influence and authority within health care settings.

In other words, computerization in health care systems presents social workers with a challenge as well as a threat. The purpose of this paper is to help social workers in health care to confront this challenge.

In the paper, we briefly describe the social work implications of recent trends in computerization and information technology in health care systems. This is followed by a more detailed description of recent information systems innovations specifically signed for health care social workers. We conclude with a discussion of recent findings of studies concerning social worker utilization of computers and information systems. From these, we derive some of the conditions that must be created if health care social workers are going to effectively use rather than be used by computers and information systems.

Trends in Computerization and Information Technology in Health Care

Initial hospital information systems, developed in the 1960s and 1970s, were usually centralized systems run on mainframe computers, and focussed mainly on information needed for hospital management, billing, and generating externally and internally required reports. With the advent of smaller, more powerful, and cheaper microcomputers, hardware is now distributed and placed with the actual user. The focus on "end-user computing" (5) means that computers are no longer the property of computer specialists; professionals can enter data and generate reports on terminals in their offices, rather than having to depend on remote computer personnel. Since hospitals have been at the forefront of computer utilization, hospital social workers are likely to have computer terminals on their desks within the next decade. Networking systems can integrate different types of microcomputers or can link microcomputers to the central data processing system of the hospital.

In terms of computer software (programs), large hospital information systems are still designed and developed by computer specialists. With the arrival of interactive microcomputers, however, different types of general (nonprogrammer) applications software have become available. One type of general application software, a database management system, for example, permits professionals who are not computer specialists but have had a small amount of training to create and produce a relatively sophisticated computerized information system, often in a matter of days (6, 7). Such a database system can be tailored to the specific needs of a hospital unit or a social work department. It can be an independent system or it can interface with the centralized hospital information system. The database package is frequently combined with a spreadsheet program (usually used for fiscal planning and report generation) and a statistical package (for more sophisticated analyses of cumulative patient data). This combination of software packages can meet most needs for patient information by health care social workers, or by other health care units.

An alternative to a tailor-made database is to buy one of the commercially developed standardized hospital social work information systems, such as HSWIS (8) or ASSIST (9). The package allows the collection of a standardized database for hospital social work practice, but can also define and add more data elements according to the specific needs of a social work department.

Computer Applications for Health Care Social Workers

Although information technology offers great potential as an aid to health care social workers in their day-to-day tasks, the actual use of computerized information systems has been limited and slow to develop (7, 10). Fiscal and administrative uses dominate over applications to health care itself, both for hospital-wide information systems and for social work health care systems. This lag in the diffusion of information system use results from a combination of factors. Information technology lends itself most easily to structured tasks that are repetitive and routine (11, 12). However, many of the tasks of social workers in health care are semistructured or even unstructured; they are complex, and the information needed for each task is frequently not well defined. In addition, there are few resources designed to assist and train health care social workers in what computerized information systems can do and what is involved in developing computerized patient records (13, 14).

Current computer applications in health care social work focus on information systems. One of the major contributions to developing health care information systems useful to social workers' administrative and clinical tasks has been the work of Claudia Coulton in cooperation with the Society for Hospital Social Work Directors (8). Coulton (15) developed a hospital information system that can document the effectiveness of the social work department. The computerized information can contribute to identifying whether the department is meeting its goal of reaching all patients in need, giving priority to those at high risk, achieving timely discharges, identifying discharge problems, resolving social problems, and improving quality of care. The system can also produce information that can contribute to cost containment, such as timely discharge planning, patient and family education, and referrals to community agencies, and it can document lack of aftercare resources that may contribute to excessive cost (15).

Another pilot project is developing a computerized information system supporting social workers' tasks in two ambulatory care units, a diabetic renal unit and a renal transplant unit (10). In these units, social workers' tasks include brief, intermittent, or ongoing treatment of renal patients and family; consultation with other health care providers in the hospital and the community; referral of patients; assisting patients, family, and staff in planning for discharge; and providing follow-up services to patients and families experiencing emotional trauma related to the increasing severity of renal dysfunctions. The microcomputer-based information system, currently being tested for utility, contains the following sets of data:

1. Standard demographic and registration information (allowing for the interface with central administration and the medical database);
2. Family, social, and community data, including available resources and referral information;
3. Type of care provided, and monitoring of patient outcomes;
4. Clinic-specific data, such as unique information required for diabetic renal patients, or for kidney transplants.

The software is a database management program which is also used for the medical database of the two units, thus allowing integration of the medical and social work information systems. The entire system is menu-driven, so that users can enter data and obtain reports with a minimum amount of computer training (10).

In addition to the kinds of patient information referred to above, the management information system developed by the Social Work Services Department at The Mount Sinai Hospital gives particular attention to departmental and hospital-wide quality assurance information on an ongoing basis and to quarterly surveys of inpatient satisfaction. In addition, surveys of outpatient satisfaction in various sites, as well as a hospital-wide survey of staff satisfaction based on a random sample of all hospital employees, have been conducted by this unit (16).

Apart from such tailor-made information systems, used for specific social work units or for specific tasks, a number of standardized hospital social work information systems are being developed and implemented. The Hospital Social Work Information System (HSWIS) was established to create standard terminology, definitions, and a minimum database for hospital social work, and to allow the development of a national database (8).

According to the Task Force on a National Database, the objectives of HSWIS are (a) to provide information that departments can use to compare themselves with similar departments in other hospitals; (b) to provide information about hospital social work and the patients that can be disseminated to others, for example makers of public policy; and (c) to compile a database that can be used for research on social work practice (8).

Another standardized package for hospital social work departments in ASSIST (Advanced Social Service Information System Technology). The package contains 8 modules, including Patient Statistical Information, Quality Assurance, Community Resource File, Financial Information, and Custom Reports (9). The purpose of ASSIST is to enhance the planning and coordination of social services by providing useful reports, query access, and research data to managers, supervisors, and clinical staff.

In an even broader effort, the Veterans Administration Hospitals nationwide have agreed to use a standardized information system based on MUMPS with extensive intake, monitoring, and report generation packages designed specifically for social workers (17). It is unclear at this time whether such standardized packages will be widely adopted in social work health care, or whether increasingly user-friendly generalized database management packages will be preferred for developing information systems that can be tailored to the needs of individual units.

Despite these recent innovations, most hospitals still use computerized information systems primarily for fiscal and administrative tasks. Information systems for patient care are mainly used in teaching and research settings. Consequently, social work departments within health care settings find themselves in a crucial transition phase. Although there is an increasing awareness of the potential of information technology and of the range of experimental programs available for health care social workers, social work departments still lag behind in the application of information technology. Social workers, therefore, need to focus on the conditions that must be created if computer technology is to support their professional expertise in a changing health care environment.

Conditions for Confronting the Challenge

In a discussion of the factors facilitating or impeding the utilization of computerized information systems, Keen (18) suggests that four interrelated sets of variables are necessarily involved: (a) the attributes of potential users; (b) the organizational context in which the system is located; (c) the computer and information technology employed; and (d) the task structure to which the information system is applied. Each of these dimensions suggests conditions that must be met if health care social workers are to meet the challenge of computerization.

User Attributes. It is logical to assume that the attitudes, knowledge, and skills of potential users will significantly affect computer utilization. Much has been written about the negative attitudes to computers of mental health professionals (7, 19). However, in two recent empirical studies of computer and management information system utilization by social workers, pro-computer and pro-research attitudes were found to be much less significant to actual use of computers than was anticipated.

Thus, in a study of 60 human service administrators, managers, and direct service practitioners enrolled in continuing education workshops, Mutschler and Hoefer (13) showed that despite the fact that the majority of respondents held negative attitudes toward computers and felt that the "negative aspects of computers outweigh the positives," there were no statistically significant relationships between attitudes toward computers and computer use (manuscript page 10).

Similarly, in a study of staff utilization of a computerized information and program evaluation system in a residential child care agency, Grasso et al. (20) found that the effects of pro-research attitudes were relatively slight.

In both studies, however, training was highly related to utilization. So, for example, Mutschler and Hoefer (13) found that 79% of the social workers who used personal computers at work had received some kind of computer training, whereas only 30% who did not use computers had been trained (manuscript page 9).

These findings suggest that if health care social workers are to confront the challenge of computerization, they must acquire the knowledge and skills required to use computers and information systems. These can be acquired through professional education in social work schools that teach computer skills, through extramural continuing education courses, and through in-service training. With regard to where the training is received, Grasso et al. (20) found that agency-based training was far more effective than training received in professional school. Wherever the training takes place, the findings of these two studies suggest that attitudes toward computers and toward research are far less important than knowledge and skills development.

Finally, Mutschler and Hoefer (13) found a statistically significant positive relation between involvement in professional associations and use of personal computers and, as well, a statistically significant positive relation between computer use and decisional discretion (page 13). Although their study was exploratory and not based on a representative sampling of social workers, their findings suggest that those who are routinely employing computers may be at the forefront of the profession and may be receiving greater discretionary authority in their own agencies.

Organizational Factors. However skilled in the use of computers and computer-generated information social workers may be, they will not employ these skills in an unsupportive organizational environment. Some of the organizational elements that are likely to contribute to computerized information use are (a) a supportive hierarchical structure; (b) in-service training structures; and (c) a reward structure that reinforces computerized information use.

In a paper describing the organizational theory underlying the design of one agency's management information system, Grasso and Epstein (4) detail the unique informational needs of occupants of different positions in the organizational hierarchy. They theorize that direct-service workers, supervisors, program managers, and executives will utilize the information output of a management information system to the extent that their different, and at times conflicting, needs for information are met by the system.

The viability of a computerized information system is equally dependent on occupants of these different positions fulfilling a unique set of role obligations in relation to the information system. Thus, direct-service workers are required to feed into the system complete, accurate, and timely information regarding their clients and to flexibly and creatively employ informational output in treatment and service delivery. Supervisors must use information concerning worker-client interaction, worker productivity, and worker compliance in a positive, instructive, nonpunitive, nonbureaucratic manner. Program managers must learn to treat program monitoring, quality assurance, and evaluation data as more than simply an accountability requirement of an external funding or accrediting agency. Instead, they must make use of this information, along with their qualitative observations of program operations, to make effective decisions regarding program maintenance or modification (21). Finally, agency executives must learn to use the informational output of the system for external advocacy for new service delivery programs. In addition, they must be able to effectively advocate for maintenance and expansion of the information system itself.

To fulfill these role obligations at every point in the agency hierarchy requires that all staff receive training specifically linked to their location in the agency hierarchy. The findings cited above (20) that information system utilization is more strongly correlated with agency-based training than with graduate social work training is not surprising in this regard. However, it suggests that agencies have a special obligation to provide such training if the challenge of computerization is to be met.

Finally, if information is to be accurately entered into the computerized system and effectively utilized when it is fed back, the formal and informal reward structures of the organization must reinforce these functions. Hence workers at all levels of the organization must be rewarded for accurate and timely information input and for appropriate use of information output in fulfilling their organizational functions. This requires that the agency be structured to reward honest data entry rather than directly or indirectly support falsified success indicators (22).

In addition, it requires that staff at all levels be rewarded for creative, balanced, and effective use of informational output rather than for rigid and mechanistic reliance on quantitative computer output alone. It is precisely here that a combination of quantitative and qualitative data-gathering, analytic, and interpretive (21, 23) approaches to social work practice-research utilization are most needed.

The foregoing discussion suggests that if social service departments in health care agencies are to meet the challenge of computerization, they must invest considerable resources in in-service training for staff at all levels and must structure reward systems that reinforce proper use of computerized information systems by staff at all levels in the agency hierarchy.

Computer and Information Technology. A third set of factors affecting computer and information system utilization involves the technology itself, and more particularly its accessibility to the practitioner. Referring to this dimension, Mutschler and Hoefer (13) report that it is not users' attitudes, but rather "the amount of training and easy access to a computer [that] are the most important factors related to computer use" (manuscript page 15). Similarly, in their study of information system utilization in a residential child care setting, Grasso et al (20) found that the most powerful predictor of utilization was staff perceptions of program efforts to facilitate utilization. These "facilitators" included the timeliness, packaging, and relevance to practice of information feedback.

Another aspect of accessibility is involvement in the development of the information system in the first place and in its subsequent modification. This requires system software that is flexible and open to modification (16), and system administration that is open to the appropriate involvement of social work staff in decision-making with regard to system design and modification (21, 24).

Consequently, if the departments that house computers and information systems in health care agencies are going to confront the challenge of computerization, they must authentically and effectively involve social work staff in decision-making concerning system issues that affect their practice and their worklives. If, instead, research and management information system administrators use their technology defensively and attempt to insulate their decisions from practitioner involvement, the result is likely to be worker alienation from the information system, data falsification, and nonutilization.

Task Structure. A final but essential aspect of utilization is the task structure itself. This refers to the actual work of practitioners at each level in the organizational hierarchy. Within each level, practice is likely to involve everything from highly structured, repetitive, and routine decision-making to unstructured, unique, and nonroutine decision-making. This is as true for executives as it is for direct-service practitioners.

At this point in their development, computers and information systems are best suited to support decisions that are closer to the structured, repetitive, and routine end of the continuum. In principle, computers and information systems could support and facilitate more effective and efficient practice at every level in the agency hierarchy. It is clear however, that most current systems are designed to support the decisions and information requirements of program managers and accountability agencies. This is particularly ironic in view of the fact that direct-services practitioners usually shoulder the burden of collecting this information. Unfortunately, this irony is not lost on direct-service practitioners when they receive little useful information feedback in return for their data-collection efforts. Even worse are the utilization prospects when line workers receive negative sanctions for information that they have entered or failed to enter into the system.

In support of these generalizations, Mutschler and Hoefer (13) found that 72% of respondents said their agencies purchased computers for "administrative uses," whereas only 29% identified the agency purchase as for "clinical uses" (page 7). Not surprisingly, these researchers found their sample clinicians to be "especially skeptical of computers" and only half as likely as managers to agree that "computers can aid work with clients" (manuscript page 10).

At the very least, this suggests that information system designers must more effectively link data collection and feedback with the more routine, bureaucratic, decision-making tasks performed by direct-service practitioners. A more ambitious agenda involves the linkage of information collection and feedback with the less routine treatment decisions that clinicians make. This requires that as much attention be given to identification of the empirical determinants of practice decisions as to the needs of information system design. This is where recent work in the design of "expert systems" promises to be helpful (11). Based on artificial intelligence models, these systems generate a knowledge base and set of decision rules that are triggered by data derived from practitioners.

In another approach, Boysville of Michigan, a residential child care agency, has spent the last four years developing an information system that is "driven" by the information requirements of clinicians and, at the same time, "integrated" with the information requirements of supervisors, managers, and executives and with the monitoring requirements of accountability agencies (4, 25).

This matching of information technology and treatment technology can be achieved. However, it requires an awareness of and a sensitivity to practice issues on the part of systems designers, an involvement of practitioners in the design process, and a considerable investment of resources in conceptualization of practice, a search for existing research instruments or the development of new ones that support the mode of practice performed by clinicians, and the provision of feedback to clinicians that is timely, accurate, and packaged in a useful format. It also requires extensive staff training to demonstrate and reinforce appropriate clinical utilization of the information feedback (26).

Although the example involves a child care setting, the model described can be applied to health care settings as well. In fact, it could be argued, for better or for worse, that social workers in health care settings are most involved in practice decisions that are guided by quantitative information such as availability of beds, DRG requirements, availability of nursing home placements, and the like.

Although we are not suggesting that social work practice decisions in health care settings can be made by computers, we are suggesting that information systems integrated with and driven by the task structures of direct service practitioners in these settings have the potential to powerfully enhance the effectiveness and efficiency of their decisions. Mutschler and Raphelson's (10) work in the development of "decision support systems" for social workers in ambulatory care is a case example of such an effort. To meet the challenge of computerization in health care settings, system design that is integrated with the task structure of health care social workers and intensive training for utilization must take place.

Summary and Conclusions

In this paper, we have described recent trends in the development of computerization and information technology and their implications for social workers. Next, we described specific health care information systems and computer applications designed for utilization by health care social workers. We ended with a discussion of some recent studies of computer and information system utilization by social workers and the broader implications of these studies for individuals and for organizations.

The two studies of computer and information-system utilization cited here (13, 20) suggest that if health care social workers are to meet the challenge of computerization, it is less important that they learn to love computers than that they learn to use them appropriately and effectively in their practice. In order to do so, health care agencies in which they are employed must provide the proper technological, reward, and training support structures.

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An Economist Looks at the Future of Health Policy

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The Historical Burdens

The nation entered the 1980s with burdens created by the choices made in 1965 when Medicare and Medicaid were set up. Medicare provided nearly full payment for covered medical services for the elderly, regardless of income, whereas Medicaid offered discounted payments for medical care for the nation's poor.

The Legacy of Medicaid

The commitment to a two-tier system expressed in P.L.89–97 set the stage for the elaborate mechanisms to define eligibility for the means-tested program that constituted the lower tier. Strict criteria for eligibility were necessary in order to restrict the numbers of clients that would be subtracted from the full-price market reserved for private practitioners.

The geographic variation in benefits that followed from having a separate Medicaid program legislated by each state prevented nationwide achievement of a decent standard of medical care even for the limited group deemed eligible.

The terms of payment to providers under Medicaid and the clerical work and delays involved were unattractive to physicians, and thus helped impose a physical separation of markets; the poor tended to use distinct locations of care. These included "mills" created by those practitioners who saw a way of converting the poor into revenue sources by offsetting low per-service allowances (fee schedules) by high, doctor-generated volume of visits, tests, and treatment procedures.

The Legacy of Medicare

The Medicare system also embodied choices that had a disequilibrating effect both financially and in health terms (1). Specifically, it was oriented toward care of acute illness, and it used a fee-for-service system to pay physicians, and retrospective reimbursement of audited costs to pay hospitals.

Omission of Chronic Illness. Chronic illness and its sequelae tended to be shifted to other financing sources. In particular, nursing home care was financed by Medicaid and by private (self and family) payments. As more 65-year-olds survived into really high age groups, the amount of chronic illness and functional limitation increased, and the system failed to cope with the service needs these trends implied. Impoverishment of the old-old and the permanently disabled living alone meant that private resources dwindled just as needs increased.

Omission of Preventive Services. Medicare also failed to incorporate preventive services and programs, thus doing little to check either the volume of illness (which affected its own liabilities) or the residual effects (the burden of which was largely carried by others). It also omitted coverage of eyeglasses and hearing aids. Thus it missed important opportunities to protect the functional level of elderly persons whose sensory limitations contributed to many difficulties of daily living. Hearing and vision problems could mess up medication schedules, increase accident risks, and accentuate social isolation.

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Omission of Outpatient Drugs. Medicare, by omitting payment for outpatient drugs, preserved a financial barrier between the elderly with limited funds (excluding the 14% who qualified for and received Medicaid as well as Medicare) and maintenance regimens that could avert serious episodes or permanent deterioration of health.

Omission of Sociomedical Diagnosis. Medicare also omitted support for the types of sociomedical diagnosis that are appropriate for elderly persons, specifically functional assessment across all major dimensions of daily living and evaluation of both the physical and social environment (2).

Furthermore, it did not offer doctors an incentive to spend sufficient time with elderly patients to address their underlying as well as their immediate problems, to adapt their strategy to the changes that age alone may produce in normal test values, and to plan realistic treatment protocols for multiproblem patients. Nor did Medicare reward those services of health personnel other than physicians that might be necessary for social and health maintenance, or cover transportation to care for those with mobility problems.

Incentives for Technological Innovation. The money that Medicare did make available to providers gave them an incentive to develop and supply technical procedures that would increase revenue, and the terms of reimbursement by Medicare did not subject providers to any conditions that would substantially limit the application of newer techniques. The requirement of medical necessity does not constitute such a norm because it focuses on a diagnosis being present. Doctors who found a condition for which surgery was a possible treatment mode (for example, a cataract) could decide whether or not to operate and what procedure to use, and got no reward for being conservative.

Retrospective Payment and Control by Authors of Health Care. The retrospective system adopted by Medicare had been used since the 1930s by private insurers for younger groups, subsidized by favorable tax treatment of employee benefits. The reimbursement approach in common use thus placed the fate of Medicare program finances and the character of medical and surgical treatment for the entire economically able community within the control of the authors of care—physicians, hospitals, and producers of equipment and drugs. Their specific interests might differ, but they shared a common attachment to expansion. The physicians can be further broken down into first-line researchers and active followers in the diffusion process. Together the influences of these parties made high-technology care a major tenet of professionalism. The patients to complete the process were easily found, because surgery for the elderly became progressively safer and more feasible, and physicians were trusted as guides, while fear of life-threatening and disabling illness provided a motivation.

The economics of Medicare—fee-based payment to physicians for acute care and retrospective reimbursement of hospitals—reinforced the effect produced by the interests of medical science and the public in innovation, and by professional dominance in treatment decisions. The financial burden on individuals was sufficiently lightened by Medicare to make the demand of many elderly insensitive to gross price. Patients had neither an incentive to refuse offered treatment nor the information that would develop independent judgment.

The economics of the marketplace also contributed to technical expansion, for competition among institutions and of those professionals who are attached to a given institution against peers attached elsewhere has been a factor in the diffusion of medical technology.

The case for adopting innovative techniques is based on either superior health results or more efficient resource use without sacrifice of health results, or in some cases, both. It is necessary in the interests of both economy and benefit to patients to limit new techniques to applications where their advantages are supported by good scientific evidence. Controversies over coronary care units, ultrasound, coronary artery bypass surgery, and pacemaker insertion (3, 4) should give us concern about the tendency to extend use of an innovation to categories where such evidence is absent.

Since excessive restriction of innovative procedures will deprive many patients of enormous benefit, we need to give careful consideration to policy options such as imposing guidelines for performance of procedures, improving consumer information, and constraining the financial incentives for inappropriate care.

The retrospective payment of hospitals was basically oriented to protecting the financing system against fraud, but it did provide a framework for cross-subsidization by the hospital—a social redistribution (avoiding a legislative route) covering the care of some, at least, of the patients who were without adequate direct or indirect (third party) means of paying. The conditions were, however, left up to the hospital, and their performance was variable and unmonitored. Under the Hill-Burton Act of the 1940s, hospitals receiving federal funds for construction were supposed to give some care to the poor, but it was not until decades had elapsed that the obligation to the poor was quantified, and the minimum amount clearly was treated as a maximum by some institutions (5).

According to Section 2173 of OBRA-1981, states are required to give consideration to hospitals serving a disproportionate share of poor patients in determining reimbursements. (New York uses a bad-debt and charitable-care pool that makes payments to hospitals rendering uncompensated care, financed by a surcharge on bills to paying patients.) The guideline, intended to encourage access by the poor, is reported to be of questionable efficacy nationally (6). In June 1988, federal regulations were proposed to require hospitals with emergency rooms to provide emergency care and care to women in labor, regardless of ability to pay (7).

The initial decision of Congress in the 1960s to cover only the elderly and the Medicaid eligible (categorical or categorically related) was consonant with the history of rejection of proposals for universal health insurance. There were indeed grounds for the fear expressed by some that the costs of general population coverage would be too high. High cost was predictable so long as fee-for-service payment to doctors and retrospective reimbursement of hospitals were in force, and there was effective political opposition to changing these principles. The administrative costs incurred as a result of claims-based reimbursement added substantially to the problem (8).

Capitated Prepayment Alternatives. Capitated prepayment is an alternative to fee-for-service payment. The encouragement to develop capitation payment systems that was offered through the Health Maintenance Organization (HMO) Act was modest because of the many conditions that had to be satisfied for federal qualification of plans. It is argued that efficient resource use by HMOs depends on management, and that a lack of good managers, heavily demanded by tertiary care institutions and other organizations, has constrained the ability of HMOs to expand. Despite fluctuations in government support, HMOs did grow to cover over 28 million persons, but the HMO changed from a reformer's dream intended to combine efficient delivery with attentiveness to subscribers' total health, to a protean entity whose character depends on markets and sponsors. The image of HMO efficiency is threatened by instances of a multiplicity of competitors striving for a footing in a given local market, and the image of sensitivity to consumers is impaired by reports of large organizations acquiring HMOs and then seeking to slough off the less profitable enrollees.

The competitive interest of HMOs in acquiring and holding a clientele that is generally considered desirable, such as employer groups, may lead to price quotations that can only be fulfilled by allowing a divergence between promised benefits and actual performance. The form of HMO that involves risk-bearing by individual practitioners accepting capitation has limited resemblance to the ideal vision—group quality norms and interactions of professionals in the patient's behalf—contained in the original HMO concept, and consumer governance, another piece of the ideal, is hard to find. Doctors trained in the traditional private practice system may have adhered to their former ways, whether working within groups or participating in an Independent Practice Association (IPA) as solo practitioners.

Cost Containment in the 1980s

The government's decision to cover some and not all of the population for health care, and to separate the covered group into those with presumptive financial need (the elderly) and those with demonstrated need (the Medicaid-eligible poor), had an important consequence for the system. It implied that the problem of health care could be addressed by partialization. But doing so set up a dynamic of cost shifting. If program sponsors were faced with rising costs because of forces that the initial legislation set into motion, they could solve their problems by limitations in eligibility, service scope, quantities of service, or place of service, or by increasing the proportion of charges to be met by recipients of service. They could show "progress" without in the slightest affecting real resource allocation, and their actions could result in increased financial burdens on those initially deemed vulnerable because of either presumed or demonstrated need (9).

The cost containment initiatives of the 1980s have worked generally in this direction. Specifically, the DRG method of prospective payment of hospitals has created dislocations in care patterns that are not yet fully evident or appreciated. The occupancy rate of hospitals has gone down, as DRGs penalized above-average length of stay for common diagnoses, and encouraged hospitals concerned with revenue to shift to services not reimbursed by the DRG method (10). This provided a pathway to further cost inflation.

To the effects of DRGs was added that of the third-party encouragement of use of outpatient locations for preadmission tests and surgery as the cost of an inpatient day went up. Small hospitals have been financially threatened by the induced drop in occupancy, thus affecting availability of beds in smaller communities and poorer neighborhoods, and do not have the cash to convert part of their plant to alternative uses. A strong demand for nursing home care, with waiting lists and difficulties for less affluent applicants, coexists with partially emptied hospitals. Home health services have expanded but the quality of service is a problem; for example, some agencies serve merely as brokers for nursing and other personnel, unregulated and unregulating. The effect of DRGs on family caregivers has not been measured, nor was a plan for monitoring effects on quality of care an integral part of the prospective payment system.

Thus the government's decision to compensate by cost containment strategies for its initial infusion of effective demand into a market dominated by private expansionary influences generated further regulatory costs, opportunities for counter-maneuvers or gaming by providers, and social costs.

Limits of Workplace-Based Private Coverage. Experience with use of privately organized arrangements supported by tax subsidies to overcome financial barriers to health care has revealed the limitations of coverage based on the workplace. The group health insurance design focuses on protection for the core labor force from costs of acute illness. From this population group a flow of productivity is expected that will essentially support the outlays involved. But group insurance did not extend its shelter to the peripheral labor force, and, being dependent on the financial viability of an employer firm, is ill-adapted to needs of retirees, disabled workers, and the unemployed.

Moreover, as costs rise, the probability that the employer will serve as the perfect economic agent for the worker in the health care market diminishes, for their interests diverge. Even within the regular labor force, "coverage" was an ambiguous term, for maternity benefits were second-class, and some other benefit provisions perpetuated social prejudices against those afflicted by certain conditions, such as alcohol abuse. Benefit design never anticipated or accepted all the needs that could arise within a given "covered" population. However, the limits tend to be renegotiated as attitudes change, and for a time this helped widen the scope of benefits.

Employers have undertaken strong initiatives in the 1980s to restrain the cost of the fringe benefits to which they had committed themselves through collective bargaining or by unilateral personnel policies. Many of the changes involved searching for more economical and efficient providers or combinations of services. In addition, employers, by "unbundling" and internalizing certain functions previously purchased as part of a package from insurance companies, avoided legal regulations affecting sellers of group insurance, such as reserve requirements.

Other changes, however, boiled down to pure cost shifting to employees. Many employees have had to start paying a share, or an increased share, of premiums for themselves, and the entire cost of dependent coverage. Deductibles were increased, second opinions were mandated for specified conditions, and limitations were set on some services. Pre-admission certification became widespread. Some retirement health benefits vanished with the termination of pension plans by employers in financial trouble or actually bankrupt.

Little is known about the out-of-pocket costs or sacrifice of services that result from the various curbs installed by employers. These have often been adorned with the philosophy of a partnership to check cost inflation by cost-sharing, on the assumption that the patient's utilization decision can be altered by changing cost terms without harm to health. This assumption stresses the control exercised by the patient and underestimates that of the physician. Moreover, there is evidence that copayments cut down on use of preventive care.

Other employer approaches, using the IPA or Preferred Provider Organization (PPO), depend on physician control to trim services, thereby exposing the insured person to the risk of inadequate care on the one hand, and motivating patient selection of providers depending on anticipated health needs on the other. Generally, the reliance on competition as a method of reducing costs to an efficient minimum failed to prevent costs from rising (and in fact, has added marketing costs to the system), and has diverted attention from development of coordinated care resources in a given region. Since services have many dimensions, apparent low cost may reflect reduced service. Providers or insurers competing to attract group business may offer packages that benefit employers at the expense of users. And burdens can be shifted to servers of last resort, the public sector institutions.

Complications in Our System

Our health care system has generated various complications.

- Enormous and costly organizational efforts are made to separate the full-pay patient from the indigent in order to preserve the private market.
- A rising cycle of technological innovations continues. Many of them are meritorious, but their use is not necessarily restricted to situations of demonstrated clinical superiority, including absence of unwarranted risk, and those where the change offers economy, compared to alternatives, in attaining a given level of health outcomes.
- The fee-for-service system of physician reimbursement places the public at risk of physician providers expanding volume if fees are controlled, raising fees if unchecked, adding collateral services to increase revenue per visit, and changing service descriptions to qualify for higher fees.
- Lack of laboratory quality assurance raises questions about the quality of laboratory work done in doctors' offices in order to augment revenue, and of analysis done by commercial laboratories. Deficiencies signify missed opportunities for disease and rational treatment.
- Third party restrictions that limit provider revenue or service volume from one group of patients may result in inflating services to other patients in order to maintain previous income.

Regulation of provider behavior—not only that of physicians and hospitals, but also nursing homes, some health agencies, and others in both the for-profit and the not-for-profit sectors—is costly, complex, and often not very successful. Indeed, it may have perverse effects. Shortell and Hughes (11) find that mortality of inpatients is greater in states that have had strict regulation of either hospital payment rates or facility construction, and in states that had more competition as measured by the percentage of the population enrolled in HMOs. The adverse effects were worst for conditions that would be most susceptible to outdated facilities and thus would be sensitive to restrictions on construction through certificate of need (CON) programs. The authors suggest, with regard to the effects of competition, that hospitals have incentives to develop alternatives to inpatient care and therefore may divert resources from acute inpatient services. The study, covering the period July 1, 1983 to June 30, 1984, does not measure the influence of DRGs on mortality.

The future of health care policy in the United States seems to depend on a contest of groups that look to the market for efficiency and ability to satisfy consumers, and groups that are critical of market failures. The number of those who do not wish to reject or abandon the goal of health care as a right that generates public obligation is growing, but clearly the contest is far from over.

How Analysis Can Help Optimize Care

Meanwhile, there are areas of health care policy where information and analysis can help avoid repeating missteps of the past, and there are many ways in which the analyst can help the health care system to use its opportunities to promote optimal health. These possibilities are listed below.

Using Cost Effectiveness Measures. A distinction should be made between use of cost effectiveness analysis and other studies to guide optimal resource allocation in the provision of socially necessary services and the development of preventive programs, and acquiescent participation in cost containment decisions that push costs from the public to the private sector, or reduce service, or do both. As suggested in the description of some recent trends, it is possible, without abolishing any of the programs that have been enacted as our national expression of commitment to assuring access to health care, to violate the integrity of these same programs by controls aimed at cutting program costs. The policy analyst can help detect, measure, and evaluate these effects and can assist in helping society choose options more in tune with the social interest in optimizing the public's health and economic security through health care.

- Methods of cost sharing that reduce the financial protection offered by a program against costs that are nondiscretionary and without regard to income level (such as flat deductibles) are questionable in terms of equity.
- Retroactive claims denial also leaves the patients at financial risk, even though from the point of view of the patient the service was not elective and was received on the recommendation of a doctor.

- Methods of cost control that allow providers to shift their resources to uncontrolled areas of service encourage them to attract excessive utilization to the profitable areas (for example, outpatient surgery).
- Controls that make certain classes of patients unprofitable may deprive those with important needs of access.
- Motivations may be set up to reduce inputs that impair quality of care in myriad ways, including time allotted for explanations and Procrustean schedules of patient processing.
- The shift of responsibility to family members is recognized as a potential effect of cutoffs in hospital services. It is a form of cost shifting insofar as unpaid time replaces paid inputs, and it contains threats to equity because individuals differ in resources available to them through the family, and family caregivers differ in the sacrifices entailed by the services they supply.
- Finally, corporate chain decisions about facility location and operations may affect the fate of small communities' health care (and health care jobs) (1, 12) but can do so only because of business privileges and large contracts that fall within the jurisdiction of various government bodies. The effect of these business advantages could be measured and the behavior of these organizations could be kept within limits by appropriate legislation.

Meeting Neglected Needs. Moreover, since we do use a market to produce and obtain health care, it is to the public interest to empower consumers and to adapt the offered service products to neglected needs.

- The policy analyst can explore the effects of providing alternative sets of quality information to users of health care, or alternative modes of supplying information, on consumer choice and provider performance.
- Price information can be treated in the same way.
- The analyst can participate in the creation, pricing, and trial of a package of health services for elderly adults that has as its treatment goal the preservation of functional level and that can be incorporated into geriatric office practice.
- Finally, the analyst can assist in a long-overdue integration of occupational health with general personal health services, including the training of physicians in taking an occupational history and reviewing the patient's current work environment. The resource costs involved in giving a place to occupational health in the general medical system and in alternative ways of bringing these changes about should be estimated.

Conclusions

I have mentioned several items that belong on a pragmatic agenda with the thought that the best health care system should not be the enemy of the good. In addition, the exercise of analytic functions in the service of even limited public goals will help us to realize that monitoring, evaluation, and informed choice will always be necessary. Even given universal health care coverage, we will have to reconcile enthusiasm for new technologies with the discipline of scientific evaluation, including cost-effectiveness comparisons. And we have to learn and apply more formal and credible methods of quality measurement that go far beyond the subjective opinions of selected experts or crude statistics.

Analysts cannot find in numbers the answers to value choices about whether health care should be financed on an actuarial or an ability-to-pay basis (13). But they can help the community resist being intimidated by those who claim that an advanced society cannot afford basic health care for all its members.

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Patient Compliance with Therapeutic Advice: A Modern View

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"Compliance," in clinical parlance, means patients doing what the health professionals want them to do. Other names for this phenomenon are adherence, concordance, and cooperation.

The term "compliance" is not much liked by many thoughtful scholars of health care. They point out that compliance suggests an asymmetric relationship between clinician and patient: the clinician knows what is best and prescribes, the patient accepts and cooperates. This is consistent with how the term "compliance" is used in other aspects of medicine to connote acceptance or accommodation to a dominant force. For example, an artery or lung is "compliant" to the extent that it accepts the pressure applied to it. The term "adherence" is not much better; platelets adhere to (stick to) blood vessels, a passive phenomenon. "Concordance" implies peaceful relations, which may exist between patient and doctor whether or not the doctor's advice is taken. So for want of a better term, and because it is familiar, I will use the term "compliance" in this discussion.

Published reports of research on compliance have increased dramatically in proportion to the rest of the medical literature over the past 30 years, to nearly 200 per year at last count (1). The articles have been widely dispersed in the medical literature, few appearing in any one journal (2), although there is now a journal devoted entirely to compliance, *The Journal of Compliance in Health Care.*

So there is a substantial data base, numbering thousands of references, to guide our understanding of compliance. Not all of the research is strong, nor is the strongest work always cited (2). But taken together, the literature yields a useful set of information.

In this article, I review what we know about compliance as of the late 1980s. First I review how often noncompliance occurs; types of noncompliance, including overcompliance and partial noncompliance, and their meaning; and risk factors for noncompliance and how noncompliance can be recognized. Then I consider how compliance can be improved. The context is the clinical encounter between an adult patient and a physician in which a medication is prescribed. I hope the discussion will also serve, to some extent, to illuminate other aspects of compliance: when a parent or caregiver, not the patient, is to be compliant; and other medical recommendations, such as appointment keeping, screening, diet, or psychotherapy.

My emphasis is on those aspects of noncompliance that make a difference, in human terms, and that stand a reasonable chance of being corrected by practical means.

Frequency

Rates of noncompliance vary according to characteristics of the patients, prescription, criteria for compliance, and many other aspects of the therapeutic encounter. In general, noncompliance rates are in the 25%–50% range. Sackett and Snow have summarized the literature on compliance up to the late 1970s and tabulated compliance rates according to expected behavior (appointment keeping, medication, diet, and other preventive regimens) and duration (short-term and long-term) (3). There is no conspicuous pattern in the reported compliance rates measured by these categories, except perhaps that

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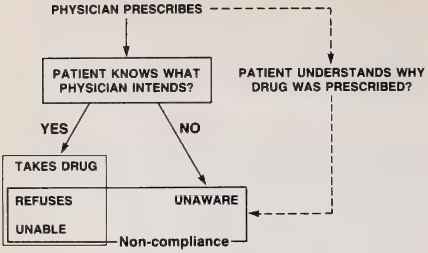
PHYSICIAN PRESCRIBES
PATIENT KNOWS WHAT PHYSICIAN INTENDS?
PATIENT UNDERSTANDS WHY DRUG WAS PRESCRIBED?
YES
NO
TAKES DRUG
REFUSES
UNABLE
UNAWARE
Non-compliance

Fig. 1. Reasons for noncompliance: a practical view.

rates are lower for appointment keeping and for preventive health care and diet.

Types of Noncompliance and Why They Occur

When patients do not take their medications as prescribed, what has gone wrong? Obviously, the potential reasons are many. Some investigators (4–6) have found it useful to take a pragmatic approach to classifying reasons for noncompliance (Fig. 1).

Misunderstanding. Before patients can comply, they must first understand what it is they are supposed to do. That is, they must know that the medication prescribed is supposed to be taken. They must also know the recommended dose schedule, but that tends to take care of itself, when the patient is living at home, because it is printed on the bottle.

A number of studies have shown that patients often do not understand their physicians' "orders" and that this misunderstanding accounts for a substantial proportion of noncompliance. For example, Fletcher et al found that patients in a general medical clinic did not know about 10% of the medications their physicians had prescribed (6). Brody found that 9.6% of patients interviewed immediately after seeing their physician failed to report at least one of their medications (7). Hulka found that private-practice patients with congestive heart failure or diabetes mellitus did not know the correct dose or frequency of 17% of their drugs (5).

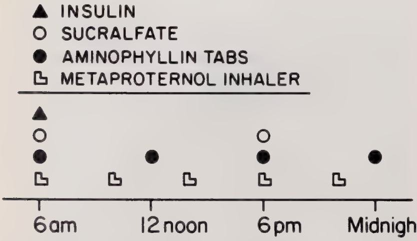

Fig. 2. The medical regimen is often confusing: drug regimen of a typical patient with diabetes mellitus, peptic ulcer disease, and chronic obstructive lung disease.

It is not difficult to see how this sort of misunderstanding can arise with modern therapeutic regimens. Take, for example, the therapeutic regimen of a patient prescribed four drugs for chronic medical conditions: diabetes mellitus, peptic ulcer disease, and chronic obstructive lung disease (Fig. 2). He is not an unusual patient; in my hospital's medical clinic, over 10% of patients are taking at least six medications. Imagine trying to master so many different drugs, several times a day. What if drugs, frequencies, and doses are changed from time to time? The expected happens. Several studies have shown that the higher the number of medications prescribed, the less patients understand that they should take those drugs (4–6).

Substitution of generic drugs for brand names is another obstacle to compliance. In most states, pharmacists may substitute one brand for another unless the physician specifically requests otherwise. Whatever the merits of this practice in terms of cost savings, substitution can be confusing to patients. They often depend on the size, shape, and color of pills, rather than drug names, to tell their medications apart. But different brands of the same drug may have entirely different appearances (Fig. 3, left). When one brand is substituted for another, patients lose their main cue for identifying their medications. It is not uncommon in practice for patients to telephone their physician after filling a prescription, complaining that they have been given the wrong drug because they have received one with a different appearance.

Also, altogether different drugs can have a similar appearance (Fig. 3, right); what began as folic acid, Esidrix, and propanolol on the prescription pad all become just another small round yellow tablet in the bottle. Things get worse when patients put several of their medications in the same container, a common practice.

Therefore, compliance begins with the patient understanding what the physician has recommended. It is a necessary, but not a sufficient, condition for compliance.

Inability to Comply. Patients may understand what their physician has intended for them but be unable to comply (Fig. 1). The most obvious reason for this behavior is that drugs are

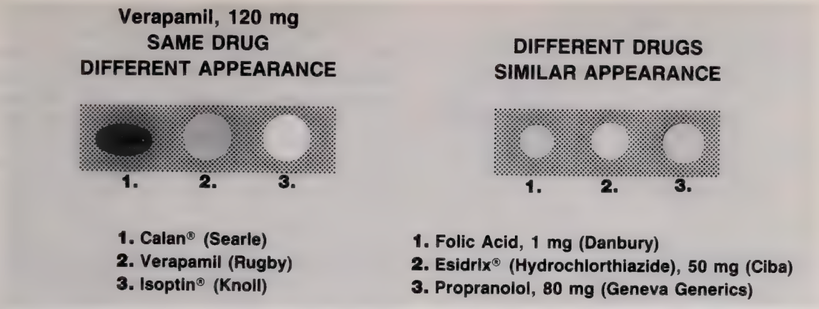

Fig. 3. Patients cannot rely on size, shape, and color to recognize different brands of the same drug or to tell apart different drugs. **Left**, three brands of the same drug; **right**, three tablets, all small, round, yellow, and scored.

expensive. For example, lovastatin, one of the best available drugs for the control of hyperlipidemia, costs from $600 to more than $1,800 per year (8).

But there are many reasons for noncompliance other than willful refusal. For example, I found that in an urban medical clinic the most common reason for patients not keeping their scheduled appointment was that they were too sick (16 had been seen in emergency, had been admitted to the hospital, or had died before the scheduled appointment), were busy working or out of town, or did not know about the appointment. Together, these accounted for over half of missed appointments (9).

Refusal to Comply. Finally, patients may understand what is intended and be able to comply, but refuse to do so. This is often assumed to be the most common reason for noncompliance, but it is not. Hulka found that for only 3% of drugs did patients know the correct dose, the correct frequency, or both, but did not take the drug as prescribed (5). Refusal to comply must account for only a fraction of the noncompliance rates.

When patients choose not to comply, there are many possible reasons. Boza et al. (10) have summarized some of them: denial of illness, nonacceptance of chronic disease, refusal to make life-style changes, token compliance, physician testing, gambling, preferring to have disease symptoms, a pessimistic attitude, and delusions.

Understanding Why a Drug Is Prescribed. Many scholars of compliance believe it is important for the patient to understand why a medication is prescribed. However, this belief may be mostly a matter of faith, reflecting the values of the scholar and not necessarily those of the patient. In my opinion, it is far more important that patients understand that they should take a medication and that they take it. If knowing why favors this process, so much the better. Hulka has shown that patients who know the functions of more of their drugs take their medications more accurately (4). However, this relationship may not be cause and effect; perhaps more capable patients do both things well.

But if it gives patients satisfaction to know what their drugs are for, that is a good end in itself.

Overcompliance. Who sets the "gold standard" for noncompliance? Usually one of the physicians. But patients may have several physicians, each with somewhat different agendas, and each prescribing different medications. The result can be "overcompliance," patients taking medications that were not prescribed by the index physician.

Overcompliance is common. Hulka found that physicians were unaware of 19% of the medications their patients were taking (5). Fletcher et al found that internists in a teaching hospital were unaware of a similar proportion, 21%, of the drugs their patients were taking (6). Some of these drugs (coumadin, digoxin, oral hypoglycemic agents, cortisone, and isoniazide) were potentially dangerous and might interact with other medications internists prescribe.

Partial Compliance. When judging the consequences of noncompliance, it is often assumed that anything short of nearly complete compliance is a failure. But this judgment rests on three assumptions: that the physician has chosen the correct dose of medication; that studies of blood levels of the drug, on which many dosing recom-

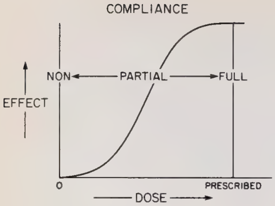

Fig. 4. The effect of partial noncompliance depends on where the dose taken is on the dose-response curve.

mendations are based, yield good guides to dosing; and that anything short of the prescribed dose is not useful. These assumptions may or may not be correct (Fig. 4).

First, the dose of medication for an individual patient is usually based on published reports of the average dose for groups of people under ideal conditions. (Rarely, as with digitalis and beta-blocking drugs, the dose can be titrated against a biologic response, such as heart rate.) But the correct dose for an individual may be much higher or lower, depending on that person's absorption and metabolism of the drug, disease severity, and other factors. There is enormous variation in the dose-response curve from person to person, often larger than variation from inaccurate medication-taking. If a patient takes less than the prescribed dose, and that dose was in fact too high, he or she may be getting just the right amount, and be spared toxicity that might have come with the prescribed dose.

Second, the dose of many drugs is chosen because of the drug's half-life in body fluids, not because of its biologic half-life—that is, the duration of actual effects intended. For example, the serum half-life of many antihypertensive medications (such as thiazide diuretics) is short, measured in hours to days. But the antihypertensive effects of these medications is much longer. In recognition of this fact, the recommended frequency of many antihypertensive medications has been reduced in recent years.

Third, there is good evidence that partial doses of many drugs yield partial effects. For example, analysis of data from the Veterans Administration Cooperative Study of hypertension has shown that considerable therapeutic benefit is obtained with pressure reduction to levels well short of normal (11). Thus, if the patient does not take all that was prescribed, much good could still have been done. Part of the reason may be that the biologic half-life is longer than the serum half-life.

Thus, the net effect of partial noncompliance may be, in some circumstances, beneficial to the patient. When the noncompliance is prompted by side effects, the patient's choice not to take all that was prescribed may be particularly wise. Unfortunately, these wise choices are balanced, to some extent, by unwise ones—as when the patient wants to have blood pressure controlled, and to avoid the consequences of uncontrolled hypertension, but stops taking antihypertensive medications because he or she feels well.

Is Noncompliance "Bad"?

The literature on noncompliance has taken on a new tone in recent years. There are more articles about whether patients should in fact comply. What used to be assumed—that physicians know best and that patients would be well advised to do as they are told—is now regarded as an ethical question, open for debate.

Much of the debate revolves around the meaning of informed consent. It is reasonable to allow competent patients to decide for themselves, as long as they have given informed consent. But, as Engelhardt has asked (12), what does it mean to be "informed" and what does it mean to give "consent"? Both can take place over a wide range of thoroughness. For example, a physician may carefully explain all of the reported side effects of a prescribed medication, their rates, and consequences. Or the physician may simply say that he uses the medication often, few patients have had complaints, and he would like to hear about any symptoms that arise after the drug is begun.

The day-to-day practice of medicine, where as many as 50 patients may be seen per day (some for a matter of minutes) does not allow for the kind of communication that ethicists and lawyers would consider ideal. Physicians and patients regularly must be engaged in trade-offs between patients' autonomy on the one hand and physicians' authoritarianism on the other, just to get through the day. As a practical matter, the best one can hope for is that the trade-off is sought in good faith on both sides, and that greater degrees of informed consent are sought when the stakes are particularly high—for example, before a dangerous or expensive procedure.

Risk Factors for and Recognition of Noncompliance

Risk Factors. Many studies have investigated how well sociodemographic, clinical, and health care variables predict noncompliance. The thrust of these studies has been etiology: which characteristics (of the patient, the physician, the therapeutic encounter, or the health care system) are independently associated with noncompliance, everything else being equal. For the most part, these studies have found only weak and inconsistent predictors (13, 14).

Usually, conventional wisdom has not been sustained. For example, it is generally believed that the poor and poorly educated are less likely to comply. But many studies have found the poor no more or less compliant than more affluent or educated members of our society. The reasons for noncompliance may be different; for example, the poor may have more difficulty understanding what is intended or more difficulty paying for the prescribed medications, whereas the well-to-do may second-guess the doctor or trust in their accustomed good fortune. But whatever the reasons, the net effects—rates of compliance—are not conspicuously different across sociodemographic groups.

Clinical Assessment of Noncompliance. It is a different question whether physicians can predict noncompliance in individual patients under their care. Perhaps the therapeutic relationship holds clues, over and above those measured as variables in research, that allow physicians to predict which of their patients will and will not comply. Most of the potential clues to noncompliance (Table 1) are available to the clinician, depending on the circumstances; a few are used only to monitor compliance in clinical research.

TABLE 1
Potential Clues for Recognition of Noncompliance

Clinical*	Research
Clinical judgment	
Asking the patient	
Low compliance with previous or related recommendations	
Failure to achieve the therapeutic goal	
Absence of pharmacologic effects or side effects	
Measurement of remaining medication	Measurement of remaining medication
Body fluid analysis	Body fluid analysis
	Markers (e.g., riboflavin)

* Adapted from Sackett DL (ref. 15).

None of the clues is foolproof. Pill counts may be useful for acute drugs, where the starting point is clear-cut and recent. But they are less practical when medications have been refilled many times, depending on when appointments could be scheduled, and remaining doses from one prescription are available after the patient has obtained the next refill.

As for drug levels in body fluids, extremely low values strongly suggest noncompliance. For example, if a digoxin level is very low, one can be confident a patient is noncompliant with digoxin. But serum digoxin levels do not allow for precise monitoring of compliance; other sources of variation (biologic, measurement) have too large an effect on the levels.

With all these sources of information at physicians' disposal, their ability to recognize noncompliance is still not good. At least, it is usually not accurate enough to serve as a basis for major therapeutic decisions, such as raising the dose of a potentially dangerous drug that appears to be ineffective.

However, there is a special case in which clinical recognition of compliance is relatively accurate. If a patient is asked, in a nonjudgmental way, if he or she is taking a drug and the answer is "No," there is a good chance (some estimates are about 85%–90%) (14, 15) that the patient is in fact not taking the drug. But if the answer is "Yes, I am taking the drug," all bets are off. These observations reflect the strong social desirability of appearing to be compliant. Few patients have the temerity to admit they are not taking their medications. If they do admit it, they are likely to be telling the truth.

What is a nonjudgmental way of asking about compliance? In general, the tactic is to "unload" the question, to make it socially acceptable to admit to noncompliance. One might say, in effect, "Everyone forgets to take their medications from time to time, that's natural. I do myself. Do you forget sometimes too?"

Increasing Compliance

Although many articles have been published about interventions to improve compliance, there are few take-home messages for clinicians. Part of the problem is that compliance rates vary according to the situation: prescription, duration,

TABLE 2
Strategies for Improving Compliance

Involvement of family member
Provider-patient interaction
Written instructions and self-monitoring
Special packaging
Simplifying the therapeutic regimen

Adapted from Morisky DE (ref. 17).

patient, setting, and so on. Another problem is in common with most other bodies of literature: the number of studies of any one subset of conditions (for example, compliance with short-term, curative oral medications in children) is small and many studies are not particularly strong. Also, the possibility of "publication bias" (16) exists; what is reported in the literature may be a biased sample of compliance-improving strategies in practice, biased either because the authors conducted the research with preconceived notions or because manuscripts with positive conclusions are more likely to be selected for publication.

Table 2 summarizes some approaches to improving compliance. They should be regarded as promising hypotheses rather than established facts.

Summary

Considering all the hurdles between the advice to take medication and the taking of it, that patients comply as well as they do is remarkable. It is all the more remarkable when physicians ask patients who are well to take costly and unpleasant medications or diets (for example, for hypertension or hyperlipidemia), day after day, to prevent low-probability events many years in the future.

The problem of noncompliance will remain with us; it is, after all, part of the human condition. It will not be, and probably should not be, conquered altogether. Because many prescribed medications are not powerful over and above their placebo effects, noncompliance often does no harm. When patients refuse to do what physicians advise, as expressions of their own informed free will, it is also unclear that harm has been done.

What we, as a health-care community, should be most concerned about is the noncompliance that arises for other, less ambiguous reasons: failure of communication or lack of opportunity. The main issue, as I see it, is to find ways to reduce unnecessary and harmful noncompliance—that is, noncompliance that occurs because of misunderstanding about what has been suggested and what is at stake, or because of poverty and other logistic problems. Therefore, I have emphasized those aspects of compliance in this review.

Compliance with medical advice is far too complex, especially these days, to reduce to a simple yes-no dichotomy. A great deal of wisdom is called for, both on the patient's and on the physician's side, when medical advice is given.

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Social Work: An Important Component of Community Medicine at Mount Sinai School of Medicine

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This paper reviews the origins, evolution, and role of social work in a medical school and highlights some of its main achievements. It is written from the perspective of two physicians who defined and implemented the work of community medicine in the medical school and helped to incorporate social work into the department's academic structure.

When the Mount Sinai School of Medicine of the City University of New York opened in 1968, its founders pledged that the new school would emphasize the social as well as the clinical and biological missions of modern medicine (1). As an instrument to this end, the first president and dean, Dr. George James, established a Department of Community Medicine with distinct responsibilities as an agent of community health (2). He took the bold and unorthodox step of giving social work a strong position along with the traditional population-related health sciences of epidemiology, biostatistics, health economics, health planning, behavioral sciences, and environmental and occupational medicine.

Why Social Work in a Medical School?

The impetus for including social work in the medical school's structure grew out of the century-old social mission of the hospital. Mount Sinai, originally called The Jews' Hospital, opened in 1855 as a custodial home for the "needy sick." At the beginning, it was a social service institution under the administration of a group of lay Jewish philanthropists in which medicine played a small role. This form of hostel was lodged in the Judaic and Christian ethos of humanitarianism and charity. By the turn of the century, as doctors began to turn to the hospitals for their workshops and laboratories, the institution became biomedical, offered acute care, and began to exclude those persons whose sickness was complicated by social and environmental problems requiring long stays. A shift occurred from the charity hospital to the voluntary one, and with it came the shift in power from lay to medical leadership. (Rehr H, Social epidemiology for social workers in health care, 1986, unpublished).

The first social services were performed as early as 1868, by women auxiliaries visiting patients in their hospital rooms and their homes to help them deal with their social problems triggered by illness. It was these women who brought a humane, social perspective to the medical environment. Their role and influence was formally confirmed with the creation of the Ladies Auxiliary Board as an arm of the Board of Trustees empowered to "supplement the medical care provided by the hospital by such services as will further the welfare of the patient and the family" (3).

The Auxiliary Board played a major role in the evolution of social work in this hospital. Its members, wives and other relatives of trustees, physicians, and philanthropists, were endowed with the power of their kin. As they saw the need for full-time attention to this aspect of medical care, they created the Department of Social Work

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in 1904 and have supported its activities ever since. Over the past eight decades the department's professional leaders, have worked in close and continual alliance with members of the auxiliary, offering, as a bulwark to their humanitarian bent, sophisticated knowledge of how illness and the care system influence the patient's and family's course for good or bad. The departmental leaders developed programs to help the auxiliary board members gain in-depth knowledge of the medical world and of issues in health care delivery and legislation. Thus, the auxiliary's abilities to influence hospital affairs were increased.

Social work has derived its power in large part from this ongoing mutual alliance. This, along with support from physicians and trustees over sustained periods of time (social work early gained representation on the Board of Trustees), wove the social work department into the cloth of the hospital. Its leaders worked to integrate social work activities into the mainstream tasks of taking care of patients, making these visible to many constituencies. The ever-augmenting cadre of social workers made measurable contributions by providing social health services to its diverse consumers: rich, poor, middle class; Jew, Hispanic, Black, Asiatic, and Anglo-Saxon. Maintaining the keen sense of social mission which characterized the original hospital of 125 years ago, the hospital's Department of Social Work has become a model nationally and abroad.

Thus, it was logical for the medical school's founders to include social work in the new school. At a time when patients' rights and consumer movements were emerging, the founders believed that medical education needed to anticipate significant social changes and to predict their effects on the health care delivery system. Clearly, social work, with its own knowledge base and clinical skills, good relationships with community leaders, and capabilities in outreach activities, belonged in the academic arena.

Locating Social Work

Less clear was where social work would fit best in the school's organization. In many places social workers have contributed to medical education by supervising home visits made by medical students, participating in interdisciplinary teaching teams, acting as consultants, and carrying primary teaching responsibilities in a limited number of electives (4). For the most part their faculty appointments have been to clinical departments, usually psychiatry and pediatrics, reflecting a particular departmental emphasis rather than a school's philosophy.

The intent here was to position social work so its contribution could be broad; a committee addressed the question of where social work would be best placed to do this. One strongly held view was that social work should have its own department in the school. Another view held that social work would be in a better position to make its specific contribution if it worked in partnership with other professions and disciplines in all phases of the school's programs. A strong argument was also made that in order for the Department of Community Medicine to address the problems of populations in a given community, diverse and distinct sets of knowledge, skills, and methods, which only several professions working together could provide, must be brought together. Social work was seen as a critical entity in this work.

This view prevailed, and social work was organized as a distinct division within the Department of Community Medicine (5). The place of social work in the school was made secure by the establishment of the Edith J. Baerwald Professorship of Community Medicine (Social Work), the first endowed chair of social work in the United States. Its creation reflected the wish of its sponsor, the late Jane Aron, member of the Board of Trustees and Auxiliary Board, to see social work become an integral and enduring structure of the medical school.

The Division of Social Work in the Department of Community Medicine

The medical school was founded at a time when medical education was "in the uneasy position of preparing physicians to reconcile the conflicting demands of a society that articulated a strong faith in the power of medical science to conquer disease, but at the same time expressed a loss of confidence in the capacity of physicians to control health and medical affairs with equity, efficiency, and compassion" (6). The Department of Community Medicine was charged with "giving both form and substance to the social mission of modern medicine" (7). This entailed developing a "third faculty" of such diverse disciplines as behavioral, environmental science, and epidemiology, to complement the two traditional faculties, basic sciences and clinical specialties.

There is a distinct difference between the practice of community medicine and that of primary care and family medicine. While primary medicine practitioners help individuals and fami-

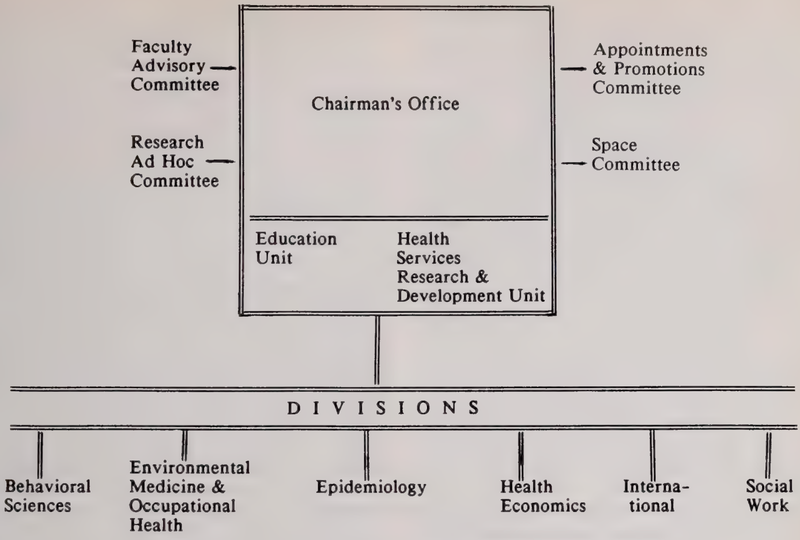
Faculty Advisory Committee
Research Ad Hoc Committee
Chairman's Office
Appointments & Promotions Committee
Space Committee
Education Unit
Health Services Research & Development Unit
DIVISIONS
Behavioral Sciences
Environmental Medicine & Occupational Health
Epidemiology
Health Economics
International
Social Work

Fig. Department of Community Medicine organizational chart.

lies solve their personal health problems, community medicine practitioners help community groups plan and develop health programs for defined populations (8). Community practice identifies health problems of population groups (diagnosis) and attempts to solve them (treatment) through better planning, organization and coordination of services and resources with community participation (9–11). It gives attention to problems in the delivery and financing of health services as well as to the mitigation of health hazards in the community (12).

The department staff is organized as a multidisciplinary faculty into six divisions and two units (Fig.).

Organization of the Social Work Division

The division has 49 social work faculty, twelve of them with doctoral degrees, whose appointments range from professor to teaching assistant. These faculty hold appointments in both the social work department of Mount Sinai Hospital and its affiliated institutions (Beth Israel Medical Center, Bronx VA Hospital, Elmhurst City Hospital, the Jewish Home and Hospital for Aged, and North General Hospital) as well as in the medical school, so that they are active in both clinical and academic pursuits.

The Edith J. Baerwald Professor of Community Medicine (Social Work) chairs the Division of Social Work and also directs the activities of the hospital's Department of Social Work Services, linking education, service, and research. As faculty members, social workers serve on many committees of the school, the medical center, and the university; social work input is made from a broad base and a variety of avenues as faculty sit on the Admissions, Promotions, Curriculum, and other committees. Social work plays an active part in the day-to-day policy making and operations of the school.

The objectives of the division of social work stem from the medical school's search for ways to bring closer together the remarkable accomplishments of modern science and technology and their humanistic application to the delivery of health and medical care services. In partnership with other disciplines, social work helps flesh out the biopsychosocial frame of understanding needed to illuminate the health needs of individuals, groups, and communities.

Role in Health Services Research and Development. Community Medicine's Health Services Research and Development Unit (HSRDU) is one of the obvious connecting points with social work. The HSRDU fosters the social mission of medicine by supporting activities which provide alternatives to the prevailing models of health care delivery, that is, population-based planning, group practice models, prepayment, financing, and coordination of health care services (13).

For several years an epidemiologist, a health economist, a nurse, physician health planners, social workers, and a sociologist worked with leaders of an established East Harlem community organization as they developed two neighborhood health centers. The community leaders were helped to define goals, write programs, secure funding, implement and evaluate their services, and establish clinical connections with teaching hospitals. Today, the community-governed agency provides health care to over 17,000 residents of the area (14). In work such as this, the HSRDU has defined how a medical school department of community medicine can help community groups plan and manage their own health care programs. Community leaders are helped to use health programs as a vehicle for social development and change.

Bridging. The department has published a series of papers which describe these community-based projects as they emerged during the last two decades (15–20). These reports cover projects in East Harlem, Mount Sinai's immediate neighborhood, as well as other regions of the USA, Argentina, Colombia, the Dominican Republic, Turkey, and China. In them, social workers surface in a significant role, as professionals formally trained to interpret and understand community needs.

Community leaders are more likely to communicate their inquiries and requests to social workers because they are "accessible" persons, easy to talk to, known entities in a complex medical center, attuned to and in close touch with community groups. Social workers rarely respond alone to the variety of health-related questions and requests, but the social worker is usually the member in the unit most able to recognize the kind of help, advice, and cooperation that the other members of the team (epidemiologist, health planner, social scientist) can provide and under what conditions. Thus the social worker serves as a bridge between that community group and other members of the technical team. In this way community-based program planning connects with technical input, and the unit fosters grassroots development.

The HSRDU social worker also acts as the liaison between the East Harlem community and other forums in and outside the medical center. As a member of committees and boards both in the medical center and in the neighboring community, the social worker is in a pivotal position to know the needs and resources of each and to use opportunities to effect a fit between the two (Julius N. The role of social work in community medicine. Presented at Grand Rounds, Department of Social Work Services, Mount Sinai Hospital, 1977, unpublished.)

Modelling the concept of working partnership, holding to the need for self-determination and respect for the pace of problem solvers and the process of problem solving, knowing that the community and the hospital need each other, enables the social worker to help bring the community and hospital together to negotiate (21).

For example, the social worker, as the HSRDU representative in the East Harlem Health Committee, a coalition of East Harlem health and social service providers and representatives from the offices of elected officials, knew in detail the committee's concerns as well as the needs of its individual member agencies. As a member, too, of the medical center's Community Board, she had been involved with the hospital's application for a Certificate of Need for its new building program, and with the approving municipal agency's subsequent recommendations. These included a requirement that the hospital start activities to improve the health of community residents, as well as a rational, regionalized system of ambulatory health services through interorganizational agreements.

The agencies represented on the East Harlem Health Committee needed a number of hospital services, and the medical center had a number of resources. Carrying out the HSRDU consultant role, she enabled the committee members to define problems and develop strategies. The medical center also had a set of needs and obligations for which the agencies' resources were needed. As the bridging person between the Department of Community Medicine and the community, she was at ease in the medical center and in the community agency and could stay related to the needs of both parties, bringing them together and facilitating negotiation to match needs and resources.

The HSRDU social worker has also worked on such community committees as school boards, housing boards, and day-care centers as a peer and colleague of other members. When they worked on evenings and Saturdays, she did too. The social worker is a person whom they see as working for them and with them; this builds trust and counteracts the medical center's often threatening image as a hierarchy and authority that may impose itself on a group.

Because of the social worker's network of contacts in the community and in-depth knowledge of agency needs and goals, members of the HSRDU look to this person as various requests for assistance are considered. They see this colleague as a reliable interpreter of the needs and wishes of community groups.

As a "provider" member, the HSRDU social worker also sits on the medical center's Community Board, where she can represent the community's interest without alienating the hospital. Co-opted by neither the community nor the medical center, she keeps the process honest.

Facilitating the Work. HSRDU members sometimes move too quickly in their natural wish to help others achieve their goals. The social worker modifies this tendency and helps them assess and support community leadership capabilities, motivations, reservations, and pace. In this sense the social worker acts as an educator, promoting their skills: to listen carefully, to catch signals and clues, to see a request as the tip of the iceberg, to elicit, explore, respond, and help the tale unfold—in essence, to respect process.

The social worker conveys what partnership through example means. In a medical center meeting with a community board, the social worker called a physician on his use of "we" (the hospital) and "you" (the community), so that he realized that his comment was alienating and that the group needed to develop some trust in Mount Sinai's stake in the joint effort.

The entire HSRDU meets weekly to exchange information, solve problems in current projects, and make decisions about new requests. Although the idea of collaboration is, like motherhood, accepted by all, in the early years of actual day-to-day work, the seven or eight disciplines did not have much feel for or experience in a multidisciplinary team. All were, quite naturally, somewhat individualistic.

The social worker and the sociologist were those who most helped the team members become a working group. The social worker "herded" them together, nudged them via questions and example. They learned what each discipline could do and became comfortable with overlapping areas of expertise, experiencing what Dana calls a sense of their professional interdependence (22). They absorbed the concept of mutuality and partnership so thoroughly that after 15 years of working together, with membership changing, an uninvolved observer of these meetings would be hard put to distinguish the epidemiologist from the social worker in the manner of their respective contributions to discussion. Yet discipline identity is preserved as the technical content of their input shows their particular perception and thrust. Each has developed enlarged capability to promote the group effort, which is indeed more than the sum of its parts.

Members of the HSRDU have become accustomed to examining their own interactions in these meetings and can pinpoint impediments to their problem-solving efforts. They can express differences and know from experience the value of candor. Moreover, the knowledge of how they operate in this group is directly transferable to their work with other groups in the community and the hospital.

The Educational Connection

The present interprofessional stance of most of the activities of the Department of Community Medicine, including education, is directly traceable to the beginning philosophy of the founders of the Mount Sinai School of Medicine (23). Training responsibilities were envisioned to extend beyond the preparation of physicians to other disciplines and nonmedical professions associated with the delivery of health care and environmental health services.

Throughout the department's education programs, undergraduate and graduate, social work contributes distinct values and orientation: identification with population needs, intimacy with individual and family psychosocial needs, stress on social epidemiology, the economic and social costs of illness (24). Social workers bring a particular emphasis on disadvantaged populations, as well as knowledge and particular viewpoint on the planning of health systems for people of all socioeconomic levels.

Undergraduate Medical Education. Social work faculty is active in the department's teaching program, which consists of a required first-year course in Epidemiology and Biostatistics; a four-week Community Medicine Clerkship in the third year; participation in interdepartmental teaching in preclinical and clinical courses; and a wide series of elective offerings throughout the four undergraduate years.

Introduction to Medicine, required for all first-year students, is an interdepartmental course in which community medicine faculty is highly involved. This course orients students to the world of medicine. Here social work is active in curriculum development as well as administration and teaching. It is part of the continuum of knowledge and experience essential to the young physician and only possible where the faculty is multidisciplinary. Social workers, physicians, and other disciplines model the interprofessional way of working together which prevails in the small discussion groups that follow classroom presentations. Medical decision-making is placed in a biopsychosocial frame of reference, along with the economic and social-policy issues of our health delivery system.

Epidemiology and Biostatistics is designed to lay the groundwork to enable students in the first year to exercise discriminatory judgment in the evaluation and application of research findings to clinical problem solving. It is taught primarily through the small-group seminar method led by a team of two, one of whom is often a social worker with expertise in leading small groups and in the epidemiology of social problems (25).

The Community Medicine Clerkship, required for all third-year students, is an interesting collegial effort in which a social worker is codirector with a physician and is the course coordinator. During the four-week clerkship, the medical student defines and implements a study of a health problem, in population rather than in individual terms, and presents these to a forum of peers and tutors (26).

Although many faculty participate as tutors, social workers are particularly involved in this role, and at any one time, seven to twelve faculty assigned are social workers. Projects fall in the areas of (a) delivery of health-care services to a specific population group; (b) epidemiologic analyses of specific health and health-related problems; (c) organization, financing, and evaluation of health-care services; (d) the social and economic costs, risks, and benefits of diagnostic and treatment interventions; (e) social and economic costs or preventive strategies; and (f) the psychological, cultural, and social influences on health and illness behavior.

Social work faculty are skilled in tutoring in connection with preparation for the project: how to identify a problem, study it, conduct a literature review, use observation and other study methods such as structured interviews, and set parameters, priorities, and limits.

Another level of guidance relates closely to clinical issues: students are helped to identify recurrent problems of a patient population as in child abuse, AIDS, or aging. Students learn from social workers how to connect clinical and population approaches, and appreciate that technical knowledge and competence in the assessment and treatment of disease is not the only requisite of good care.

The social work faculty is responsible for two of the fourteen electives offered by the department. Designed for first and second year, these are usually the student's first exposure to the patient care system and to social work as a major component in clinical care (27). During two to four hours per week spent with a social worker for a full semester, the students have direct contact with patients and families and experience with them the impact of illness on social equilibrium. The goal is to help students acquire a beginning knowledge in the dynamics of behavior, interviewing, developing relationships with patients, and understanding their own reactions in helping relationships. They are also exposed to issues and problems in the hospital's other health delivery systems, as well as resources and gaps in social and economic supports.

Residencies and Fellowships in Preventive Medicine and Occupational Health. In these programs social workers are primarily involved in curriculum development and in the selection of candidates. The cornerstone of these programs is the selection of able candidates with initiatives, motivation, and capacity to work with others. A committee matches these individuals with available resources for individually tailored training. Social workers are helpful with this. Their participation in direct teaching is mainly through interdivisional seminars and as consultants in population-focused research projects.

Social Work Graduate Education. Physicians must speak from their own bias in commenting on the educational program of another discipline. However, the placement of social work within the Department of Community Medicine has enhanced the departmental development in both education and research.

Certainly its organization as a separate division within the Department of Community Medicine enables social work to commit faculty resources to the advancement of content and method in social work education as an integral component of an academic medical center (27). Division organization also facilitates social work's leadership role and collaboration with schools of social work in the New York area in graduate, postgraduate, and continuing education, through student placements and shared teaching responsibilities.

Some of the graduate social work students placed in community medicine are training for a combined MSW-MPH degree. They have both a clinical and program-planning assignment. In these, they render direct social work services to patients and their families at clinical sites, and at the same time analyze the needs of these groups of patients as discrete populations. They look at the clinical service as a system (28) to identify how it meets the needs of the patient population as a whole, assessing patients' needs, staff interaction with patients and each other, flow of patients, accessibility, and so on. From this system analysis, they select one problem (as, for example, that of a high rate of missed appointments), track its etiology, and propose solutions, in this way developing study projects from a clinical base. They also have a health planning assignment in the HSRDU. In one instance, several social work graduate students acted as staff to the East Harlem Community Health Committee. This work exposed them to the dynamics, processes, issues, and politics of community-based planning and built their skills in working with local groups. One set of students were active with the East Harlem committee as it developed strategies to defeat the preferred-provider project which the city government was imposing on East Harlem at that time (29).

Medical and social work students were paired to interview directors of social agencies in East Harlem about service needs, resources, and gaps. This data contributed to a larger project of the HSRDU. This was a mutual learning experience under the guidance of a faculty social worker and a physician. Through this interdisciplinary working partnership, a sense of an inner-city community was developed, along with interviewing skills and knowledge of the social services network in the community.

Beyond Departmental Boundaries. Social work participation in education transcends the auspices of the Department of Community Medicine.

Many master's-level social work students other than those in community medicine have their field work practice at The Mount Sinai Hospital and the five affiliated hospitals that over the past two decades have participated in the education of several hundreds of graduate work students in affiliation with the Hunter College (CUNY), Columbia, Adelphi, and New York University schools of social work.

These students have their on-site preceptors and tutors. Thus, a wealth of experience is at the command of the social work faculty who use it to enhance social work knowledge and skills as practiced in health care setting. The division faculty teach courses, lead and participate in lectures and seminars at school sites, develop and conduct integrative seminars across school lines, serve on schools' advisory and curriculum committees, and act as visiting professors in other universities here and abroad.

Social work education programs are evaluated and innovative educational methods fostered as interprofessional programs with other departments of the medical school are developed to enable medical and social work students to learn together.

The division faculty designs and gives educational seminars for the social work staffs of the medical center and its affiliated hospitals to address educational needs common to the staffs of the five institutions.

Teaching Other Health Professionals. The wish of the founders of the School of Medicine to educate those other than physicians is probably most formally fulfilled in The Page and William Black Post-Graduate School of Medicine and the Brookdale Center. These are respected resources for updating knowledge and skills for members of all the health professions. The Division of Social Work actively collaborates with other departments to include social work content in postgraduate courses for physicians, nurses, and other professionals, as well as including courses particular to social work.

Thus social work in the department has a wide swath of influence within the community, while it maintains its commitment to excellence in practice and depth in its pursuit of knowledge.

Social Work Research

It is apparent to us as physicians how social work's special knowledge base has facilitated the Division of Social Work's sustained engagement in research activities.

We know that the profession of social work used an epidemiologic approach at the beginning of this century to "obtain social benefits for the vulnerable," as Helen Rehr has noted ("Social Epidemiology for Social Workers in Health Care," 1986, unpublished). Although in later decades this approach was infrequently used by social work clinicians, it was revived in the research activities of the division, which did pioneer work in applying public health concepts of screening to identify hospitalized patients at high social risk. Several seminal studies in this area were trailblazers in health care social work (30–32) and the foundation for subsequent additions. The division also very early introduced and applied quality assurance methods to the clinical work of the hospital's social work department.

The division has continued to connect clinical social work practice and research in the medical center and its affiliates. It has fostered research and studies in a wide range of subjects. For example, it has studied the psychosocial factors in the etiology and course of specific illnesses in various populations, such as hemophilia in patients and families, asthma in children, and childhood antecedents of atypical psychiatric disorders, as well as studying patients afflicted with myasthenia gravis and conducting a spectrum of studies on preventive and specialized services for the elderly.

Other studies have reported work on developing methodology for evaluating the outcome of social work intervention, as for example with a population of women who have had repeated miscarriages and with another high-risk population of diabetic women who are pregnant. Allied to outcome studies has been ongoing work on developing a social problem classification for health care social work, and client assessment of the outcomes of social work services.

The concept of populations at risk has involved social work in such diverse studies as the needs of the elderly in East Harlem, factors predictive of child abuse, the relationship of social support to ethnicity and culture, and many other projects geared to primary and secondary prevention.

This unique emphasis on social work's responsibilities and capabilities has engaged the division in research endeavors with the Department of Community Medicine and with other departments of the medical school and its affiliated hospitals, as well as with the administration of the hospital. Thus, a considerable part of its research efforts are devoted to studies designed collaboratively with physicians and other professionals. In these, social work contributes its knowledge of the social and psychological costs of illness and the impact of illness on the social functioning of individuals and families.

Conclusions

The Department of Community Medicine provides a supportive and hospitable environment for social work, one which has helped it flourish. Conversely, the department has been enriched by the active presence of social work in all facets of its work. Certainly community medicine's partnership philosophy, multidisciplinary composition, population-based approach, and epidemiologic outlook provide a theoretical base closely compatible with social work values.

We have observed that in most hospitals and medical schools, social work's primary emphasis has been on providing clinical services to individuals and families, not on social policy and planning. We have seen that its placement in the Department of Community Medicine gave social work the support, if not the impetus, to reunite and integrate its clinical and social health planning and policy functions. This ability to simultaneously concern itself with and make connections between the needs of an individual and those of a population has certainly assisted the department in carrying out its mission and goals.

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Education for Health Social Work Practice: Reconciling Past, Present, and Future

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In 1905, when Garnet I. Pelton introduced social work in health care at the Massachusetts General Hospital, the adequacy of education for health social work practice was not an immediate issue. In 1905, there were only four formal programs of social work education in the country (1). The purpose of this brief paper is to sketch key developments that have occurred since 1905, to identify several current dilemmas in education for health social work practice, and to suggest what needs to be done soon to resolve them.

Key Developments Since 1905

The prevailing model of practice in 1905 was the one then being developed in the charity organization societies, the model known after 1917 as social diagnosis (2). As the new specialization grew, this model was adopted and refined by hospital social workers, who were restricted to dispensary or outpatient services at the time and spent a good bit of their time making home visits and doing other work in the community on behalf of clients. This approach was entirely consistent with the social diagnosis model, vestiges of which can still be found in daily practice today.

Since only a handful of formal social work education programs existed, preparation for practice in the new specialization consisted mainly of on-the-job training, or apprenticeship. The advantage of this form of preparation was that the novice was trained to do exactly what the hospital expected the social worker to do. Its disadvantage was its rather rigid technical approach, which tended to lack a conceptual base that could be generalized beyond the immediate setting. Although this approach continued for many years, and remnants of it can still be found today, especially in rural hospitals, it was not destined to last as the predominant mode of education for practice.

Two developments made the demise of apprenticeship a foregone conclusion. The first was the establishment in 1918 of the first professional association of social workers in America, the American Association of Hospital Social Workers, later the American Association of Medical Social Workers (AAMSW). The second was the founding in 1919 of the Association of Training Schools for Professional Social Work, later the Association of Training Schools for Professional Social Work, still later the American Association of Schools of Social Work (AASSW), a forerunner of the Council on Social Work Education (CSWE). Together, they represented the move toward formal education for social work practice that had begun in earnest by the end of the century's second decade.

Both health practitioners and educators were members of the AAMSW. They served together in committees and met together at the association's regional and national meetings. From the outset they collaborated in the systematic study of practice in the health field. Gradually, these studies led to a series of publications that were major contributions to the profession (3–8).

In 1923, the American Association of Hospital Social Workers established the need "for a two-year course of study as the minimum requirement for preparing competent medical so-

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cial workers," and in 1926 became social work education's first accrediting body when it approved the medical social work curricula at Simmons College and the New York School of Social Work. After 1940, in conjunction with the American Association of Schools of Social Work, the association of hospital social workers used formal accrediting procedures to approve the medical social work curricula in 21 schools (9).

In 1939, the American Association of Schools of Social Work began to require that all programs of social work education consist of two years of graduate study based on the hospital social work association's minimum curriculum, including field work, all under the educational control of the school (10). Five years later, the Association adopted a new curriculum policy, known as the Basic Eight. This policy governed all curricula in all accredited social work education programs and required the teaching and learning of content considered basic to the practice of social work in any field. These eight content areas were public welfare, social casework, social group work, community organization, medical information, social research (including statistics and methods), psychiatry (human behavior and psychopathology), and social welfare administration (9).

Since the Basic Eight mandated the inclusion of medical and psychiatric content in every social work curriculum, every student who graduated from every social work education program had at least basic knowledge of health and illness, both medical and psychiatric. In addition, every student graduated with at least beginning skill in three discrete social work methods: social casework, social group work, and community organization, augmented by knowledge of social welfare administration. Thus, all graduates of all social work education programs were prepared at a beginning level for practice in health care. In addition, there was widespread agreement about the theoretical basis of social work in health care. The social diagnosis model had given way as dynamic psychology had an impact on social work thought and practice (11, 12) and by the 1940s, focus on psychological factors tended to dominate the practice of health social workers for the most part (6).

The ongoing interaction of practitioners and educators as members of the AAMSW, the authority vested in the AAMSW to accredit medical social work curricula, and the Basic Eight combined to make the period from 1944 to 1952 the Golden Age of education for social work in health care. At no time since has the overall relationship between the social work education and health social work practice communities been as close. Major changes, however, were just around the corner, and these changes had the unanticipated effect of separating education and practice.

Separation of Education and Practice In 1952, the Council on Social Work Education (CSWE), vested with full accrediting power, succeeded the American Association of Schools of Social Work. In 1955, the American Association of Medical Social Workers merged with six other professional associations to form the National Association of Social Workers (NASW). In 1965, the Society for Hospital Social Work Directors was established as a society of the American Hospital Association. From approximately 1955 to 1965, the new NASW carried on much of the work begun by its predecessor associations, making significant progress in a number of areas. Since that time, however, it has tended to direct its attention to new concerns. With these organizational changes, the meaningful interaction between health social workers and social work educators, so characteristic in the past, began to disappear.

In 1962, the CSWE promulgated a new curriculum policy predicated on the concept of discrete method majors. In 1969, however, this policy was replaced by a new one which set only vague standards and requirements, thus making possible what was later called the "cafeteria style" curriculum which allowed students to take almost any course they wished, often in no particular order. Finally, by the end of the decade, generic models of practice had replaced the discrete methods approach to curriculum building.

By the 1970s, concern about the adequacy of education for practice in health care was increasingly evident. Kahn noted that social workers were entering the health field with inadequate preparation and without understanding the system in which they practiced and how it interrelated with other health care systems (13). Additional statements attesting to the need for more adequate preparation of social workers for health care practice were published in 1973 and 1977 (14, 15). The problem, however, continued to grow. In 1980, a national meeting of social work educators and practitioners was held in an attempt to come to grips with the growing concern (16). Two years later, the Society for Hospital Social Work Directors of the American Hospital Association appointed a task force to work on the problem. In 1987, that task force was made a permanent standing committee of the Society's Board of Directors.

Several Current Dilemmas

In 1982, the CSWE adopted its current curriculum policy. This one requires that the second year of graduate study be devoted to some form of specialization, including fields of practice, for example, health care. This curriculum requirement has had interesting results. One example: in 1976 thirteen schools reported having a specialization in health care (17); five years later the number had grown to more than thirty (18). In a survey conducted in 1988 by the Education for Practice Committee of the Society, 46 of 83 responding schools (56%) reported they had a health specialization. However, further analysis is required before the meaning of these increases can be known, because at this point how schools define specialization in health is not clear. The knowledge and skills required for practice in the health care field, however, are well known (19, 20). Models for developing a curriculum to teach this knowledge and skill are also available (21). Nevertheless, the dilemma, whether justified or not, remains the perceived inadequacy of education for practice in health care settings. There seem to be at least four components of this dilemma.

Organizational Separation of Educators and Practitioners. The first component is the organizational or associational separation of educators and practitioners. The CSWE numbers few practitioners among its members; only a small number of educators belong to the Society for Hospital Social Work Directors, although those who do, tend to be leaders in the field. Few representatives of either group attend the regional or national meetings of the other. Although the representation of both groups in the NASW is large, the activities of the NASW are directed primarily to other kinds of activities, for example policy development and standard setting. The results of this organizational separation are sad indeed. One does not have to listen very hard to hear the frequent complaints of practitioners about the quality of the graduates who apply for positions in their settings. Similar complaints about practitioners are common among educators.

Misunderstandings on Each Side. Thus, the second component of the problem is a consequence of the first. There is a lack of knowledge and understanding among social work educators of the nature and requirements of social work in health care. Similarly, few practitioners understand the constraints imposed on social work curricula, at both graduate and undergraduate levels, by the CSWE and by the universities and colleges which house them. Attempts by members of both groups to remedy the situation have had only limited, usually local, success. A more effective structure to bring them together remains an outstanding agenda item of the profession.

Perceived Lack of Integration of Class and Field Learning. Third, concern about the adequacy of education for practice is frequently expressed in a perceived lack of integration of class and field learning. On the one hand, field instructors complain that the content taught in the classroom is irrelevant or nonapplicable to "real practice." On the other hand, educators complain that field instruction lacks a "conceptual base." If the model of practice taught in the classroom is different from the model used in the field placement agency, this inconsistency requires the immediate attention of both field and school faculty. However, this problem has proven to be so prevalent, and so unresponsive to efforts to resolve it, that Blostein has suggested that field instruction be dropped from the social work curriculum altogether and replaced by an internship (22).

Need for Collaborative Study. Fourth, the tradition of careful collaborative study and research by educators and practitioners of the functions, practices, and educational components of social work in health care, initiated by the old American Association of Medical Social Workers, needs to be revived. Some steps toward revival of the AAMSW tradition have already been taken. For example, the Education for Practice Committee of the Society for Hospital Social Work Directors, which includes both educators and practitioners in its membership, is presently engaged in a major study of perceptions of social work education involving three different groups of respondents, i.e., social work deans and directors, society chapter presidents, and society members. More of this kind of work needs to be done.

What Needs to Be Done

These, then, are some of the dilemmas facing education for social work practice in the field of health care today. Although their resolution will not be an easy task, the picture is not a hopeless one. Outstanding programs of education for health social work do exist, and these can serve as models for others. In addition, it is sometimes helpful to remember that other health care professions are faced with similar dilemmas. As a result of phasing out its hospital diploma programs and its move toward university and college-based programs, nursing, for example, is currently experiencing many of the problems social workers have faced. Not even medical education has escaped criticism and demands for change (23).

As social work educators and practitioners attempt to resolve the dilemmas they face, it must be remembered that the demands of practice and academia are different, and the rewards available in each are based on different functions and activities. What is needed at this point is to find or develop a structure that brings educators and practitioners together in systematic efforts to resolve the problems they share. The first order of business in such an effort is to learn about one another.

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Reflections on Community Health Education

A Program That Is Working

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As a movement, community health education evolved from the public health initiative reported to have originated over 4000 years ago in the urban civilization north of India at Mahenjo-Daro in the Indus Valley, where remnants of bathrooms, paved streets, and sewers several feet below the street were discovered during excavations (1). The Inca civilization also had elaborate public sewage and bathing systems. There is abundant evidence that the Egyptians developed community water collection and sewage and water disposal systems. As early as 1000 BC a temperance document urging moderation in drinking was written in Egypt, and in around 1900 BC Hammurabi, king of Babylon, formulated a code that governed health practitioners (2). The Hebrew, Greek, and Roman cultures continued to make public and community health advances, which strengthened the basis for the ongoing development of public health initiatives through the centuries.

Historically, this type of public health practice was a function of governmental and official agencies and institutions providing services to citizens. Over the years, community health education and community health promotion evolved, but narrowed its emphasis to focus on more local, collaborative efforts of citizens and local voluntary and private agencies and institutions to serve a discrete population. In practice, organized community health efforts are a composite—providing health education and health promotion opportunities and experiences; offering a forum for the exploration of affective issues (personal and cultural values and attitudes) relating to individual and family health; and creating opportunities for health skills development and practice to any group living or working within a given geographic location, or brought together by other common bonds. Sexual orientation (gay and lesbian community) or race or ethnicity (Black and Hispanic community) are contemporary examples of such bonds. The meaning of "community" has changed as the living and working patterns of people across the country have shifted. Changes in family structure, increased mobility, separation of places of employment from residential areas have all contributed to a still evolving meaning of the term "community" (3).

Current Community Health Practice

Over the past decade, disease prevention and health promotion activities have been significantly deregulated and decentralized. The shift of the delivery of health services from governmental auspices and traditional medical and public health agencies to the private and voluntary sectors has created both a demand, and a new opportunity, for health education and health promotion in the community and in the workplace (3). Illustrations of this new emphasis are plentiful. For example, in an effort to reduce health care costs, employers have sponsored comprehensive employee assistance programs concentrating on important health issues such as hypertension, smoking, stress, nutrition, physical fitness, and weight reduction. Alcohol and substance abuse counseling and referral have also become part of many employee assistance

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programs, as have preretirement preparation and counseling. Recently, employees have also mounted programs to enhance occupational health and safety.

Health education and health promotion programs are also flourishing and making a significant impact in the community. The Home Team Program in Minnesota has demonstrated how a school and community health education partnership with significant parental involvement holds promise in changing nutritional habits among elementary school children (4). Mothers Against Drunk Driving (MADD) and other community-based groups have made a dramatic local and national impact on the vital issue of drinking and driving.

The Barrio Education Project (BEP) in Texas is another example of a unique community-based health education intervention. The primary goal of BEP is the empowerment of economically disadvantaged women. Health promotion efforts center on the needs of Mexican-American women in the areas of literacy, health education, arts, and advocacy. Staff, members of the board of directors, and consumers are all bilingual, bicultural women familiar with the Mexican-American life experience.

BEBASHI (Blacks Educating Blacks About Sexual Health Issues) of Philadelphia is an example of an activist community health education project that relies exclusively on the volunteer efforts of poor and working class people to combat the AIDS crisis in minority communities. BEBASHI is one of the growing number of community-based organizations around the country trying to provide AIDS information, education, and counseling services, as well as care and support to those who have the HIV infection. The Hispanic AIDS Forum in New York, the Minority AIDS Project of Los Angeles, and the KUPONA (Swahili, meaning *to get well*) Network of Chicago are other examples of important community-driven health education and health promotion programs addressing AIDS (5).

These few illustrations reflect some of the many forms health education can take, and they highlight the range of concerns health promotion, health protection, and disease prevention can address both at the workplace and at the community level.

Principles of Community Health Education

Although the meaning of community may be different from place to place, effective community health education and health promotion in any given setting are a function of a carefully crafted collaborative process that takes place between the community and committed health providers. The essence of such an approach is as follows:

1. Setting up a community organization to galvanize local support, sense of empowerment, and involvement in the health delivery process;
2. Forging a respectful and genuine collaboration among the community at large, prospective health consumers, and health providers;
3. Identifying needs, not only by concerned health services providers, but also by the women and men to be served;
4. Establishing local priorities after appropriate needs assessment has been completed, and negotiating priorities when necessary to reflect the real and felt needs of the community;
5. Developing realistic objectives that are at once manageable and measurable, and that accurately reflect available resources and services;
6. Planning health prevention and promotion activities congruent with the achievement of stated objectives;
7. Developing an ongoing plan to monitor all activities with provision to make corrections as needed during the course of the programs;
8. Assessing overall outcomes related to stated objectives;
9. Planning for the maintenance of positive outcomes;
10. Establishing goals and objectives for future community health services.

Effective community health actions place an emphasis on detail. The closer these programs are observed, the more there is to see and understand.

A Program That Is Working

The principles outlined above were utilized by The Children's Aid Society (CAS)—a voluntary, nonsectarian agency serving children and families in New York City to address the problem of adolescent pregnancy in Harlem.

The Problem. In New York State over 60,000 adolescents between the ages of 10 and 19 became pregnant during 1986. Of these, 26,000 gave birth (Over half lived in New York City); 33,000 terminated their pregnancies. Over 1,700 pregnancies were to youngsters 10–14 years of age (6). More disheartening still are the figures applying to New York City, and in particular to the Harlem community, where the teen pregnancy rate is among the highest in the state. The personal costs to those who become pregnant in their adolescent years are severe, including

1. A higher than average risk of maternal death or complications such as toxemia, anemia, urinary tract infection, prolonged labor, or pelvic size inadequate for delivery;
2. Low birth weight, which is linked to serious, long-term health problems and infant mortality;
3. The likelihood of completing fewer years of education than nonparenting teens;
4. A higher risk of being unemployed or employed at low-paying, low-status jobs and of living at or below poverty level;
5. A higher risk of entering into an unstable marital relationship (more than half the marriages of teens who have a baby break up within three years).

In addition to the staggering costs of pregnancy for the young parents themselves, there are heavy societal costs, which are measurable only in part by the inordinately high percentage of adolescent parents who resort to public assistance and Aid for Dependent Children (AFDC), and by increased expenditures for Medicaid, abortion, adoption, foster care, juvenile justice, and child protective services. It is estimated that in 1986 the cost to taxpayers to support families that began with the birth of a child to a teen was over $16 billion. Teen males, even those who want to be involved, are often ignored, excused ("boys will be boys"), or written off.

The Children's Aid Society's Response. The Children's Aid Society Program uses a holistic approach in working with young people and their families. The approach is based on the belief that the teen pregnancy problem in this country is largely a symptom of greater social ills and must be attacked simultaneously at several levels. Further, the program holds that unintended pregnancies among poor, urban teens could be effectively curtailed if institutionalized racism were reduced; if quality education for all were available; if adequate employment opportunities for young people and adults were accessible; if ongoing and sensitive health care for families at or below the poverty line were provided.

If these objectives could be accomplished, the lives of teens and families would be affected in profound and enduring ways. No single intervention program that focuses solely on the management of the genital sexual lives of adolescents can resolve the complex nature of the problem.

In this connection, most programs around the country that have attempted to address the problem of adolescent pregnancy have had a narrow focus, one that simply considers ways to help young people develop the capacity to avoid unintended pregnancies. The Children's Aid Society's belief is that in addition to educating young people, programs must try to foster within adolescents a desire to avoid unintended pregnancy by offering them the resources and opportunities that will provide them with a hopeful sense of their future, a reason not to become pregnant at this time in their development. Unfortunately, many teen males and females do not see a future for themselves. They live in impoverished communities, see little employment opportunity, and feel they do not have the chance of living what could be called the good life. These conditions produce feelings of fatalism which run contrary to the exercise of responsible sexual behavior (or to the delay of sexual intercourse until some later time in their lives). As feelings of fatalism build, sexual intimacy often takes the place of future-oriented industriousness and ambition. In order to address this type of complex root causality, quality of life programs are a necessity. If a climate is to be created in which hope can be kindled, positive change can occur, and ongoing direction can be provided to young people, it is necessary to simultaneously influence multiple aspects of their lives and the lives of their families for a long period of time. This type of holistic systems approach represents an extremely complex intervention unusual in the field of adolescent pregnancy prevention.

Organizing Principles. The programmatic vision is based on several critical organizing principles that are as important as the actual service aspects.

Belief in Capabilities of Teens. The philosophy of the program is rooted in the concept that young people are capable of more than simply avoiding problems and situations that will complicate their lives. It is believed that young people are capable of doing well for themselves and their families and of making positive contributions to their communities. Simply staying out of trouble is not enough. Young people need to be encouraged to go beyond the ordinary expectations that adults have for them and to move toward higher ground in the area of ethical behavior. Few young people receive such encouragement and in its absence, they set standards for themselves and settle for lives that are not congruent with the gifts and potentials so many of them possess.

Involving Important Adults. Parents, grandparents, foster parents, and other important adults in the community are seen as significant factors in the lives of the young people served.

Therefore, programmatic dimensions are developed to involve these important adults so that they too can grow and enrich themselves. An additional benefit of this approach is that adults from the community who participate in the program become ambassadors for the community health effort and represent the program in a way that health providers cannot.

Advocating Delay in Intercourse. The programmatic philosophy strongly advocates that young people should delay having intercourse for as long as possible. Intercourse is the kind of special intimacy that best fits a relationship later in life, and young people, although physically able to experience it, are not emotionally prepared to know its full meaning or to deal with the possible consequences. However, not all young people respond positively to the advice of health providers or to the wisdom of their parents. For some, intercourse has been a way, or becomes a way, for them to cope with their feelings of poor self-esteem, fatalism, and hopelessness. So, the program is prepared for some young people not to heed its point of view. For those who have intercourse and perhaps become pregnant during their preteen or early teen years, the program continues to care and understand and does not turn its back or withhold affection or support as an expression of disapproval. Instead, the program provides ongoing guidance and on-site services even for those young people who do get pregnant.

Involving Boys as well as Girls. The program is for males as well as for females. Special efforts are made to hire male staff, to provide activities that are attractive to males (male discussion groups, lifetime individual sports), and to express the kind of care and concern that interests them initially and then helps sustain their participation. One of the shortcomings of many adolescent pregnancy programs is the absence of a dialect of gender that is sufficiently appealing to males. To date, 53% of the teen participants in The Children's Aid Society Pregnancy Prevention programs are male.

Groundwork. In each of the three locations at which CAS conducts the program, three to six months was devoted to community organization and open meetings on the overall goal and specific objectives of the program before any services were delivered. During these grass-roots meetings, held in the evenings several times a week at the community center that was the focus of the program, parents, local professionals, concerned adults, and ministers attended informational sessions and heard about the program idea. They were given an opportunity to express what they believe the children in their community require in order to reach their potentials and have full lives. They also had the chance to air their views on the kinds of activities that they felt would be useful for their own development.

Concerns about the reproductive health part of the program were discussed. This was a crucial aspect of the meetings, because a contraceptive prescribing and dispensing service would be one facet of the overall program of services for the teens who participated. This medical service component would be delivered in each of the The Children's Aid Society locations in the three communities. There were heated debates about the efficacy of providing such a service, but in each case, the overwhelming majority of parents in the community felt it was an appropriate health service opportunity for their children. During the sessions with the adults in the community, it was repeatedly emphasized that the program was for them as well as for their children, and that every effort would be made form the onset of the program to continue to encourage their regular participation in activities of their choice.

The importance of health providers' spending substantial time with community members discussing prospective community health activities cannot be overemphasized. Resentment, hostility, and ultimately resistance and sabotage are the inevitable results of an inadequate, disingenuous community organizing process. When contraception and other reproductive health issues are part of planned services, special attention must be devoted to a full exploration and sensitive treatment of local cultural and religious beliefs. All of this can only be achieved by thoughtful, honest, and patient communication with members of the neighborhood to be served.

Program Design. The major program components of The Children's Aid Society's primary pregnancy prevention program at three CAS centers in Central, East, and West Harlem are seven.

Job Club. Weekly two-hour programs are conducted by employment specialists in which young people explore the various types of work opportunities and career possibilities available to them. They learn about the world of work in concrete terms. Each youngster secures a Social Security card, completes working papers, learns how to complete employment applications, and takes part in role-playing job interviews with outside professionals who conduct this aspect of the program. Each youngster is guaranteed a part-time job during school, and a full-time job during the summer.

Too young to obtain working papers and typical part-time jobs, the 11- and 12-year-olds participate in the entrepreneurial apprenticeship program in which products such as hot dogs, sodas, juice, and snacks are sold at various functions held at the community centers where the program takes place. These young teens earn minimum hourly wages and work at least a year as entrepreneurs before moving on to other jobs, either in the community center, in Harlem, or outside the community. All young people who participate in the program open individual savings accounts at the Carver Federal Savings Bank on 125th Street in Harlem. They learn that banks are part of their future.

Thrift, self-sufficiency, and planning are major issues emphasized through this unique programmatic component. Members of the employment staff monitor bank accounts each month.

Homework Help, Tutoring, and College Admission. Each teen has a thorough academic assessment conducted by an educational specialist. Standardized scores are obtained in reading, math, writing, and basic age-appropriate life concepts. A prescription that summarizes strengths and weaknesses is then developed for each teen. This prescription serves as a basis for ongoing individual and small-group tutorials. New York City school teachers, college professors, and volunteers for the Junior League of New York use the prescription for their one-on-one and small-group educational sessions with teens, which occur two to four times a week. A separate homework help program is available two afternoons a week.

Young people experiencing significant problems in school are placed with an educational manager who is responsible for monitoring their progress through junior high school, high school, and into college or the work world. These highly qualified educators work with the youngsters and their families at least once a week. Tutoring and other special efforts are made to support these young people.

Teens and adults who regularly participate in the overall program are guaranteed admission to Hunter College following their graduation from high school or their completion of a high school equivalency diploma (GED). This is the only program of its kind in the United States that has received a commitment from a major university system to guarantee acceptance to college based on participation in a teen pregnancy prevention program. This commitment serves as a concrete incentive to young people interested in furthering their education and makes real the belief that college is in their future. Since the majority of the young people and adults participating in the program receive some form of public assistance, the principal costs of attending Hunter College are paid through a variety of plans available to those who qualify. In addition, the The Children's Aid Society has developed a special scholarship fund to support any of the youngsters or adults who have financial needs that go beyond those provided for by federal and state aid. Academic support services are provided as needed through the SEEK program at Hunter College as well as through various other tutorials available to those attending Hunter College.

Medical and Health Services. For four hours each week, medical and health services are provided by a registered nurse and an adolescent medicine specialist from either Montefiore Hospital in the Bronx or The Mount Sinai Hospital in Manhattan. Each teen has a complete annual physical, and girls have yearly gynecological examinations. A thorough social and family health inventory is also part of the general medical workup. When necessary, physicians provide contraceptives and prescribe appropriate birth control. The young people using contraceptives have regularly scheduled, weekly meetings with counselors to be certain they are using their contraceptives conscientiously and properly. During these sessions, school, family, peer, and employment issues are also explored. The young people and adults who use this part of the program are urged to view the physician as "their doctor." They can see the doctor and the nurse without an appointment and discuss any health or related issues with them. All of these services are held on-site in the community center.

Lifetime Individual Sports. An unusual program component offers young people skills in the lifetime sports of squash, tennis, and swimming. From a skills development standpoint, these activities require precise mastery and the exercise of self-discipline and impulse control in order to have fun or to win. It is believed that the skills and discipline necessary to achieve success in these sports are transferable to other aspects of young people's everyday lives and provide them with important experience in managing impulse control through enjoyable activities. The sports program component also provides opportunities for participation in activities not usually available to urban, inner-city young people.

Family Life and Sex Education. A formal 15-week, two-hour-per-week educational experience for teens and parents centers on the understanding of sexuality from a holistic viewpoint. Age-appropriate discussions of anatomy, reproduction, and contraception are held regularly. An ongoing emphasis is on exploring issues such as gender role, family role, body image, patterns of affection, and love and intimacy. Roles, responsibilities, and values in relationships are a major focus of this program component. Increasing the sexual literacy of both the young people and the adults in the program is a primary goal. Readings, films, role-playing, and lectures are some of the methods used.

Mental Health Services. Professional social work and counseling services are offered three days a week in each of the locations. Issues surrounding interpersonal problems, family discord, and other crises that affect a teen's individual or family functioning are explored. Clinical assessments are prepared of each individual who is seen for ongoing counseling, and the more complex cases are referred to on-site Children's Aid Society Mental Health Units or to other appropriate community mental health agencies.

Self-Esteem Enhancement. Enhancement of self-esteem is offered through the arts and self-expression by professional actors from the National Black Theater. In two-hour weekly workshops, parents and teens discuss issues ranging from conflict resolution in school and at home to presenting oneself for a job interview. Role-playing, dramatization, song, and improvisation enable young people and adults to experiment with various scenarios and conclusions and to see themselves and their peers from a new perspective. It provides a chance for reflection and feedback as well as to receive recognition and applause. Recently, self-expression activities such as silk screening and culinary arts have been added to this aspect of the program as additional vehicles for creativity. T-shirts produced in the silk screening program and snacks such as brownies and bread from the culinary arts program are sold during the weekends by the entrepreneurs.

Program activities are held each afternoon and evening and on the weekends. When young people or their parents are scheduled for an activity, a staff community organizer calls them (if there is a telephone) or gets word to them to remind them they are scheduled for a specific activity. Contracts stating the responsibilities of program participants are signed and reviewed each year as a way of reinforcing the seriousness and commitments involved in this community activity.

Outcomes. The outcomes of the three Children's Aid Society Pregnancy Prevention programs in West, Central, and East Harlem include

- After 48 months, 225 young people ages 10–18 were in the program; 53% were male and 47% female.
- 75 parents and adults were participating in the program.
- During the four years of the program, two females had become pregnant and one male had caused a pregnancy.
- All but two teens were regularly attending junior high or high school. Approximately three-quarters of them were at grade level.
- In 1988, 12 program participants—8 teens and 4 parents—were attending Hunter College.
- One hundred thirty of the teens have been employed and 60% of them have bank accounts at the Carver Federal Savings Bank.
- There has been no reported alcohol or drug abuse among program members (using family and legal justice as sources).

Conclusion

The Children's Aid Society community health education program is a complex intervention addressing a complex problem. The cost is approximately $1,500–$2,000 per person per year. Financial support comes in part from the New York State Department of Social Services, and such foundations as Gannett, Stern, Brookdale, and Aron Diamond, as well as concerned individuals. The programs operate every afternoon and evening during the week and on weekends at two of the three sites. The staff who provide the services are specialists working part-time several afternoons each week or on weekends. Ninety percent of the staff are Black and Hispanic professionals and community workers, and one-third of them live within the community.

Adolescent pregnancy prevention initiatives require a long-term commitment by providers and community members. The depth of the problem of adolescent pregnancy demands that more be done to reduce its daunting personal and social outcomes. The gains being made in sexual and reproductive health over the years cannot be fully celebrated until the teen pregnancy problem has been more fully resolved.

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Indicators of Social Risk for Poor Adjustment to Nursing Home Placement

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Abstract

In an attempt to identify indicators of risk for psychosocial maladjustment in new nursing home residents, we evaluated the first-year course of 88 new nursing home residents. These 88 study patients constituted all the new residents admitted in 1987 to the Kingsbridge Center of the Jewish Home and Hospital for Aged, Bronx, NY, and assigned to the health-related floors (indicating less serious impairments).

Social work intake and progress notes were abstracted to evaluate their utility in identifying indicators of risk for medical and psychosocial maladjustment among these patients. Patients admitted from home fared worse (had more medical visits) than those admitted from hospitals. Lack of additional findings suggests that more uniform and structured intake and progress assessments be made.

The scope of the use of social workers' assessments of risk in acute care hospitals may often be limited by policies and practices of the institution. Most notably, many social workers assess only patients referred to them by physicians and family members. A number of observers (1, 2) have pointed out that the selectivity of referrals has sometimes delayed the intervention of the social worker to the point at which the patient's problem is more pronounced than it might have been had that professional been given the latitude to assess all patients on admission.

Social workers in long-term care settings are generally free of these constraints; typically, they work with all patients in the institution, beginning when the patient is admitted. This policy offers them an opportunity not available to many of their colleagues in acute-care settings—to conduct psychosocial screening of the entire nursing-home population. Under these circumstances, there is the possibility that assessments conducted by social workers can be useful in offering the institution a broad perspective on the needs and characteristics of all of its patients.

This study was undertaken to review our psychosocial knowledge base of nursing home patients in an attempt to identify indicators of risk for medical and psychosocial maladjustment to long-term residential health care placement.

Methods

Setting. This study was conducted at the Kingsbridge Center of The Jewish Home and Hospital for Aged (JHHA) located in the Bronx, New York. JHHA is a teaching affiliate of the Mount Sinai School of Medicine, City University of New York. This nursing home has 816 beds, 544 designated as skilled nursing beds (SNF) and 272 as health related (HRF). At the time of this study 102 of the 272 HRF beds were designated as "enriched HRF," with additional staff and services to serve a more physically and mentally frail population in preparation of conversion of these beds to a SNF level of care. This study was conducted on the HRF floors of the nursing home.

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TABLE 1

Characteristics on Admission, 88 Nursing Home Patients

Characteristic	N	%
Sex		
Male	22	25.0
Female	66	75.0
Age		
<80	17	19.3
80–84	24	27.3
85–89	25	28.4
≥90	21	23.9
Marital status		
Single	10	11.4
Married	11	12.5
Widowed	67	76.1
Mental status		
Alert and oriented for time, place or person	60	68.2
Moderately confused	25	28.4
Severely confused	3	3.4
Level of care prior to admission		
Living alone with no help	15	17.1
Family support	26	29.5
Outside help	27	30.7
Other facility	20	22.7
Reason for admission*		
Physical deterioration or rehabilitation	76	90.5
Caregiver or personal loss	48	57.1
Mental deterioration	29	34.5
Progress note comments*		
Resident doing well	22	25.0
Adjustment problem	25	29.1
Medical problem	54	64.3
Family loss	1	1.2

* Total adds to more than 100% because of multiple reasons for admission and more than one kind of problem.

Study Design. The basic design was that of a historical cohort study in which all admissions to the HRF units during the 1987 calendar year were identified and followed up for one year. Patient status on admission was determined by chart review. The areas reviewed were demographics (age, sex, marital status, race), reason for admission, where patient was admitted from, mental status, and medical diagnoses. In addition, the social workers' admitting summary was reviewed with particular attention to whether the patient was felt to be resistant to life in the home, whether the family would have difficulty with separation issues, and with what frequency the patient would have visitors.

It is normal practice at JHHA that social work staff complete an unstructured Progress Note, which identifies whether the patient is "doing well" or is experiencing any psychosocial adjustment or medical problems, on admission, one month later, and every six months thereafter. Data were abstracted from this form in order to evaluate its predictive utility.

Outcome variables included transfer to hospital; transfer to a higher level of care (either an enriched-HRF or an SNF bed); number of medical, psychiatric, and subspecialty visits; decrease in level of activity; decline in functional ability; and death.

The initial degree of and changes in the level of activity were based on written comments in the social workers' progress notes, which describe the patient's participation in the structured activities in the nursing home.

Decline in functional ability was measured by score on the Patient Review Instrument (PRI), a report, completed on each patient semi-annually, which is submitted to New York State for reimbursement reasons. The Activities of Daily Living (ADL) section of this report covers four areas—mobility, transfer (to and from bed, toilet, and chair), eating, and toileting. Scores for the areas are used in determining the amount of care a patient requires. Each parameter of ADL is scored on a five-point scale, 1 indicating total independence and 5 total dependence. When the score at one year after admission exceeded that at admission, the patient was judged to have experienced a loss of functional ability.

The results were analyzed by cross-tabulating potential indicators of risk with outcome measures. The chi-square test was used for qualitative data, the Student's t test for quantitative data.

Results

A total of 88 new patients were admitted to the HRF units during the calendar year 1987. Three-fourths of them were women (Table 1). The average age was 85.1 (range: 67–97). The majority were widowed, and two-thirds were mentally alert. The level of care the patient was receiving shows that the majority were dependent to some extent on others prior to admission. Physical deterioration is the most common reason for admission, followed by loss of a caregiver and mental deterioration. During the first few weeks of admission, one-quarter of the patients were doing well—both physically and emotionally. Although patients are admitted only if they are medically stable, medical problems needing attention were noted on over one-half the new admissions.

Scores for ADL, which are taken from the PRI forms, reflect the patients' functional abilities on admission (Table 2); level of activity score reflects how actively the patient is involved in

TABLE 2

Activities of Daily Living (ADL) and Level of Activity on Admission and One Year Later, 88 Nursing Home Patients

	Status on Admission		Status at One Year	
	N*	(%)	N*	(%)
ADL†				
Eating				
Independent	55	(64.0)	28	(41.2)
Some assistance	30	(34.9)	36	(52.9)
Total dependence	1	(1.2)	4	(5.9)
Mobility				
Independent	42	(51.2)	12	(18.5)
Some assistance	38	(46.3)	47	(72.3)
Total dependence	2	(2.4)	6	(9.2)
Transfer‡				
Independent	50	(59.5)	24	(31.6)
Some assistance	33	(39.3)	47	(61.8)
Total dependence	1	(1.2)	5	(6.6)
Toileting				
Independent	45	(52.3)	23	(34.9)
Some assistance	40	(46.5)	28	(42.4)
Total dependence	1	(1.2)	15	(22.7)
Level of Activity§				
High	4	(4.5)	1	(1.4)
Moderate	51	(58.0)	32	(44.4)
Low	33	(37.5)	39	(54.2)

* Totals may not always add to 88 because of missing data.
† Score on ADL section of Patient Review Instrument.
‡ To and from bed, toilet, and chair.
§ Degree of participation in organized activities recorded in progress notes.

the organized activities programs. It is apparent that as a group the patients substantially declined in all areas of function and level of activity.

After one year in the nursing home (Table 3), mortality was quite high (26.1%), and more than half of the patients experienced at least one transfer to an acute-care hospital. Decline in level of activity was also substantial; about a quarter of the patients were noted to be less able to engage in institutional activities. The decline in functional abilities, as reflected by the ADL scores, are undoubtedly an underestimate of true functional decline, because follow-up reports were unavailable on a substantial proportion of the patients. This was due, in part, to early mortality and hospitalization.

All patients undergo a complete annual physical examination by a physician in addition to routine checkups every 60 days. All other medical visits are for a specific medical necessity; the number ranged broadly from the minimum of one to a high of 24 visits in one year (Table 3). Number of visits to the psychiatrist, principally for behavioral and cognitive problems, also varied substantially.

The social, demographic, and functional information obtained on each patient at or near the time of admission was tested for any associations with outcome variables. Those that demonstrated a statistically significant association are listed in Table 4. Patients described on the Progress Note as having suffered from some degree of

TABLE 3

One-Year Outcome Status, 88 Nursing Home Patients

Variable	N*	%
Mortality	88	26.1
Transferred to hospital	87	54.0
Decreased activity level	72	26.4
Decreased ADL		
Eating	66	16.7
Mobility	62	6.5
Transfer†	69	13.0
Toileting	64	9.4

	N*	Mean	SD	Range
Medical visits‡	83	6.5	5.0	1–24
Psychiatric visits	83	4.1	4.6	0–29

* Number of patients for whom data were known.
† To and from bed, toilet, and chair.
‡ Routine checkups every 60 days and annual examination are excluded.

TABLE 4

Significant Relationships Between Initial Assessments and Outcome Status, 88 Nursing Home Patients

Initial assessment characteristic	N	Statistically significant outcome variable	Significance
Mental deterioration?		Psychiatric visits (Mean ± SD)	
Yes	27	6.3 ± 3.5	t = 3.07, $p = 0.003$
No	52	3.0 ± 4.9	
Admitted from:		Medical visits (Mean ± SD)	
Home	48	7.5 ± 5.5	t = 2.38, $p = 0.02$
Other	35	5.1 ± 3.9	
Patient doing well?		Medical visits (Mean ± SD)	
Yes	21	4.5 ± 4.0	t = 2.16, $p = 0.03$
No	62	7.2 ± 5.2	
Adjusting well to N.H.?		Transfer to hospital (%)	
Yes	60	61.7%	$\chi^2 = 4.68$, $p = 0.03$
No	25	36.0%	

mental deterioration had more than twice the number of psychiatric visits than those not so described. Patients admitted directly from home had significantly more medical visits than those admitted from another medically related institution—most often an acute-care hospital. Similarly, those described as "doing well" during the first few weeks of admission made fewer medical visits during the first year than those for whom some sort of medical or psychosocial problem was noted. Difficult to explain was the finding that those described as adjusting well experienced a higher rate of hospital transfer than those described as not adjusting well. One possible explanation may be that those who were doing well sought treatment for noncritical medical or surgical problems which involved transfer to a hospital.

Discussion

Increasingly, admission to a nursing home comes at the point of some crisis in care arrangements. There is ample evidence that for an elderly individual, the transition from home or a hospital to a long-term care setting is both medically and emotionally stressful (3–5). According to Blenkner (6), older people admitted to institutions, particularly older persons with mental dysfunctions, die at excessively high rates during the first year, and especially during the first three months, after admission.

In 1976 in a study conducted at the same institution as the one covered in this paper, Rodstein et al (5) found that 67% of newly admitted nursing home patients had problems with either physical or emotional adjustment within one year of admission.

Although the HRF population at the nursing home is more frail now than when previously described (5), data presented in Table 3 of this article suggest that the problems identified by Rodstein et al have not abated. The mortality rate for the study group exceeded 26% over the course of the first year of residence.

Although the literature (7) also suggests that a number of factors can reduce the risks of stress and even of mortality among elderly patients of long-term care institutions, empirical evidence of the connection between specific psychosocial patient attributes and success in adjustment is markedly absent. In light of this lack of information, the hypothesis of this study was that intake assessments made by social workers would be useful in predicting patterns and problems of psychosocial adjustment that characterize JHHA patients over the course of their stay in the nursing home.

However, the only significant correlations uncovered by the study were either medical correlations that one might expect to find, that is, patients identified by the social worker as suffering mental deterioration had twice as many psychiatric visits as those not so characterized; or medical correlations that are difficult to explain and probably do not have much meaning, that is, those patients characterized as adjusting well were at increased risk for transfer to a hospital.

The one medical correlation that may be worth noting was that patients admitted from home had greater medical need (as reflected by number of medical visits) than those admitted from hospitals. One possible explanation for this finding is that in contrast to patients who enter JHHA directly from home, those who come to the institution after hospitalization may have been medically better studied, and thus were medically stabilized before admission.

Initial assessments of patients by social workers did indeed refer to psychosocial issues, although the observations often lacked detail. Follow-up notes described patient functioning in a general way and were not recorded consistently enough to permit classification and analysis.

The study was based on the following assumptions: (a) that professional intake assessments of patients in a nursing home would provide a clear picture of the factors that define the circumstances leading to their admission and their capacity to adjust to a new environment, (b) that those assessments could be used to identify patients at high risk for adjustment problems, and to suggest early preventive interventions, and (c) that directing social workers' attention to patients so identified would conserve scarce resources to assist those at greatest risk for adjustment problems. Finally, the assumption was that (d) this process of working with high-risk patients would be documented in follow-up notes that were structured and consistent in tracking adjustment problems during the patient's stay in the facility.

The inability of this study to utilize social work assessments to identify risk factors was disappointing. Although initial assessments formulated by social workers did provide descriptive backgrounds and did refer to psychosocial issues, they were often general, not specific. Similarly, follow-up notes described patient functioning in general terms and were not recorded consistently enough to be readily classified and analyzed.

The outcomes, however, did lead the authors to reexamine their own conception of how to conduct an assessment. This reexamination led to the acknowledgment that the preferred method of researchers—structuring and defining categories to achieve uniformity and consistency—might appear to be overly confining to a social worker who wishes to capture the richness of the patient's ongoing life experience in a more open-ended narrative report. The tension between the approach preferred by many practitioners and the methods of researchers is to a certain extent inevitable, involving tradeoffs between objectivity and sensitivity.

We recognize these complexities. But we must conclude that there is still great value in the use of more structured and consistent assessment and follow-up categories in the written documents produced by JHHA social workers. Information recorded in these categories will be meaningless unless it is grounded in the practiced and nuanced psychosocial assessments and interventions of the social workers. The challenge to translate good social work practice into more clear-cut reports is admittedly difficult but by no means impossible. Social workers have difficulty replicating their work because they have trouble partitioning and identifying what they do in relation to the professional principles of their practice. Social workers and researchers need to form a partnership to experiment with formats that call for a combination of both structured reporting and sensitivity to psychosocial issues. A format that gives social workers latitude to describe patients' behavior and characteristics in open-ended fashion could allay their concern about depersonalizing their interactions with patients during the assessment and follow-up processes. At the same time, inclusion of more defined and rigorous categories in the reports would facilitate identification of meaningful risk indicators and thus enhance the value of the social work intervention that is so critical to the quality of patient functioning in long-term care facilities.

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Social Well-Being: The Future of the Social and Health Care Systems

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Abstract

There are signs that the American public is becoming more concerned than in the previous decade with issues of compassion such as helping the poor, giving families a better break, helping children and people of color. Concern about the nation's vulnerable groups is increasing at a time of particularly profound societal change. The nation is aging demographically, vast technologic changes have displaced masses of workers, there are sharper economic contrasts than ever between the "haves" and "have-nots," and family structure is changing dramatically. In this era of change there are increased pressures on health care professionals, particularly in terms of fiscal constraints and public demands for accountability. At this time, we recommend moving toward a unified social well-being system which incorporates medical care, health care, and social services in a manner that makes the most efficient use of limited resources.

Dedication and Introduction

A few years ago, Louis Harris reported to Congress about a poll of Americans taken in 1986. He told legislators that the American public was returning to issues of compassion—helping the poor, giving families a better break, helping children and people of color (1). Certainly it is time. The previous decade brought retreat not only from compassion, but from commitment to the institutions and systems which traditionally support our most vulnerable citizens. It was a time of particular tension and introspection for the health care professions. Health-care providers—the "helping professions"—found themselves struggling on behalf of individual patients and clients against a swelling tide of poverty, illness, and misery. Providers found themselves struggling to keep critical national causes of concern in front of an increasingly skeptical and uninterested government and public.

As is not unusual in times of struggle, the health-care system turned one eye on itself. The literature of the past decade is replete with superb analyses of the successes and failures of the health-care system and the individual professions (especially medicine and social work). The literature offers an abundance of thoughtfully constructed scenarios, predictions, and exhortations to guide us into the future.

America's move back to issues of compassion, with all that signifies in terms of public and private sector support, opens a new door on the future for the nation. It offers another chance for reform and restructuring on behalf of the deprived and disabled. Of particular interest is reform in the health-care system. One compelling vision of this system's future has it becoming a well-integrated part of a larger social health-care or well-being system. It is appealing to consider a social well-being system that addresses, in addition to medical disease, the social stresses that place people particularly at risk for acute medical illness—a system that deals with prevention for persons of every age and every social sector—a system that thereby extends the efficacy of resources by retargeting a portion of them and instituting a variety of efficiencies.

The door is open and we stand on the threshold of significant change. The social work profession has been giving substantial attention to the components of a social well-being system

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and the role of various professionals within it. The purpose of this paper is to examine recent thinking about the future of social work, to view that thinking in today's political and economic context, and to draw some conclusions about what that thinking portends for the future of the entire health-care system.

Among the health-care practitioners, educators, and theoreticians talking with us about the future, Dr. Helen Rehr, one of the nation's most noted social workers, stands out as a particularly cogent, creative thinker and writer. Of the many ways in which Dr. Rehr's dedication to action is moving us skillfully toward the future, her nurturing commitment to social work's newest endeavor—the National Center for Social Policy and Practice—places her in the vanguard of social work visionaries and leaders. This paper is dedicated to the future of the health-care system—to a social well-being system, and to Dr. Rehr, who is so involved in seeing that we reach that future in robust good health.

The Context

Tom Wicker wrote that "gazing far into the future tends to diminish the events of the present" (2). Some people do prefer the softly blurred images of the crystal ball to the razor-sharp edges of contemporary epidemic social and physical ills. But tomorrow is shaped substantially by the way we mold today. So it is essential that, before we look too far beyond the present, we take a careful look at the challenges that the context of today's world is presenting for health-care providers.

Societal Changes. As the nation moves rapidly toward the 21st century, America's renewed interest in issues of compassion reflects a hopefully dramatic political change. But it is by no means the only shift of note in recent decades. We are in an era of unprecedented change—unprecedented in speed and magnitude. Of the many changes which touch the lives of America's citizens as well as health-care practice, four areas are exerting the most profound influence: changes in demography, economy, technology, and social structures.

Demographically, we are maturing as a nation and we are on the edge of a new kind of population explosion. In 1987, there were 29.8 million people older than 65, but in less than 40 years, that number will double to more than 65.6 million (3, 4). By the year 2000, Spencer (4, page 9) notes, more than 65% of all elderly will be at least 75; by the year 2050, the number of seniors older than 85 will have increased five times.

The maturation of society requires that we refocus our social priorities, redefine social programs, and—most importantly—redistribute already scarce resources. Many people predict that the refocusing, redefining, and redistributing will become a monumental, destructive battle between the generations.

For instance, do we invest in the health and well-being of America's seniors if that investment will compromise the availability of health resources for infants and children? In terms of the future, preferable is the approach of Morris who recently wrote:

> Depending on whether one is a pessimist or optimist, one can anticipate a struggle to justify the present pattern or can welcome the opportunity to create a new one. The opportunity I foresee is a new commitment to the well-being of people of all ages, in which elderly play a leading, not only a beneficial role, and in which those who study the conditions of the aged play a proactive role (5).

That optimism becomes even more important in the face of economic and technologic changes that are causing stresses that reverberate throughout all sectors of society. Many jobs are lost as industries move out of the country. Old industries are shrinking, in some cases disappearing, leaving large numbers of displaced workers to swell the ranks of the unemployed. New industries are growing, based on our vast technologic strides. Although these industries should provide a source of employment for many displaced workers, we are not providing adequate training to accomplish this shift. Neither are we preparing our youth to enter competitively into the nation's changing labor market. Masses of unemployed youth and dislocated older workers put significant stress on an already pressured health-care system.

In addition, the impressive technologic accomplishments, as well as trade- and tax-induced changes in the economy, are producing the sharpest contrast ever between our "haves" and "have-nots." We are struggling into the next century with massive deficits and with costs spiraling so much out of control that vital life necessities such as basic health care are beyond the reach of increasingly large numbers of citizens.

Finally, in addition to these stresses, the country is in the midst of formidable changes in the most basic social structure—the family. Perhaps the most significant change in the family is the rapidly increasing number of single-parent families, up from 12.9% of all families in 1970 to 27.3% in 1988. Fifty-nine percent of black families with children are single-parent families, and 33.6% of Hispanic families are headed by a single parent (6). Most of the single heads of families are women, and an overwhelming majority of these women are pervasively and relentlessly poor. Poor families are, of course, at special risk for all social and health disasters.

Volumes have been written about the changes in demography, technology, economy, and social structure so profoundly affecting the world in which we live. These brief words about the rapid changes are meant to suggest that the health-care professions are operating within a context of significant dislocation. In discussing some assumptions about the current decade, Austin points out that these "forces in American society will continue to create conditions that result in high levels of personal and household stress and that impose short-term economic dependency" (7). He goes on to note that it is just these conditions which create high levels of need for human services. That need, of course, is accompanied by the need for efficient, effective, responsive human services programs and the professionals to create, staff, and evaluate them.

Professional Challenges. The massive changes of recent years have been accompanied by significant shifts in the professional environment for social-care and health-care providers. Challenges include the extent to which the helping professions are becoming more complex and elaborated; vocal public and payor demands for ethical justification and outcome accountability; and increasing fiscal constraints. These challenges confront all the provider professions. How thoroughly we respond to them will determine to some extent how successful the nation's health-care system becomes in the next century. Fiscal issues and issues of professional elaboration and accountability are intertwined in a complex of cause and effect, but for the moment, this discussion focuses on each separately.

Professional Elaboration. The world and its systems, institutions, and needs get progressively more complicated, as do its professions. Looking to expectations of the 1980s and beyond, Morales and Sheafor (8) suggest that, in spite of fiscal constraints, jobs for social workers providing direct care will increase. Among other reasons, social workers are moving into a large number of new settings, primarily in the private sector. For example, social workers increasingly are engaged in private practice, employee assistance programs for industry, and case management for private firms. Physicians, nurses, and various allied health professionals are also moving into a variety of new private settings. In addition, in the health-care field, the shift in emphasis from inpatient to outpatient care and from secondary and tertiary to primary and preventive care, and the growing emphasis on new geriatric programs resulted in a dramatic expansion of outpatient programs in multiple settings. Health-care practitioners have accompanied their patients to these new health-care settings. The provider professions are becoming increasingly elaborate in terms of where they practice.

These professions also are becoming increasingly elaborate in terms of who practices. In the past decade, the types of health-care practitioners providing direct care proliferated. Morales and Sheafor indicate that social work, for example, is rapidly adding to its body of practitioners by training at the undergraduate level. The development of physician's assistants and nurse anesthetists parallels this move to practitioners with more circumscribed skills and knowledge. Herein lies a particular challenge.

While we are training new cadres of practitioners for direct practice, in social work particularly, there has been a significant swing toward declassification. Declassification involves shifts in job classifications which permit hiring of less skilled workers at lower salaries. Declassification also raises questions about whether, in the face of serious cost constraints, the trend will be toward the least expensive rather than the most appropriately qualified. In this competitive market there are questions about whether the social worker with a Bachelor of Social Work degree can compete with those who have undifferentiated college degrees, or even with those who do not have undergraduate degrees. The National Center for Social Policy and Practice, in a recent review of the literature, notes substantial gaps in research documenting the differences in performance and efficacy in public social-service settings between workers holding different degrees (9). While the focus of concern for social work currently is in the public arena, because of resource problems, there is every reason to assume that each of the health care professions will face similar issues in both the public and private sectors.

Declassification in public social service settings is, in many instances, a political and budgetary issue as opposed to one which lends itself to scientific resolution (10). However, the issue of what type of professional training is ideal for work in a particular setting or with a particular population is one that permeates the public and private sectors. As a field of practice and a profession becomes more complex, we are faced with the challenge and necessity of developing multiple political and research strategies for demonstrating the appropriateness and effectiveness of a variety of disciplines and training levels for a variety of practice settings.

Fiscal Constraints. Since the early 1980s, federal funding for low income, nonentitlement programs providing a variety of education, housing, job training, health care, and other services has been cut in half (11). At their highest funding levels, these programs were accessible to only a fraction of those in need. Now, that fraction is seriously diminished.

The costs and constraints in the nation's health-care system also are of serious concern. Although we have made extraordinary progress in medical and public health care, the fruits of that progress have price tags which put them well beyond the reach of increasing numbers of citizens. For example, it is estimated that at least 31 million residents of the country—many of them children and many of them employed—are without any public or private health insurance. Continually spiraling health-care costs are engendering constraints in access that range from simple, not particularly restrictive caps on the quantity and types of care provided to elaborate control systems which raise the specter of health-care rationing. In 1984, Rehr pointed out the frightening appearance of a "trend towards a two class medicine—one for the affluent and the other for the poor" (12). Many people believe that trend already has become a significant reality.

Increasing deficits and the nation's preoccupation with cost-cutting clearly have taken their toll on social and health-care programs and services. This dollar-conscious environment, with its emphasis on providing more services with less resources (including less well trained personnel), is putting significant pressures on all providers to demonstrate the needs of their clients and the effectiveness of their interventions as well as to be remarkably creative in the delivery of services. Although needs for medical care can be documented with relative ease, needs for health care and social care are more difficult to precisely document. Some would say they are more difficult to "cure" with limited resources. The challenge of an era of major fiscal constraint is to acknowledge the limitations of interventions and to support the targeting of resources for maximum impact with sound, rigorous research and political endeavors.

Justification and Accountability. Professional ethics and accountability are becoming markers of quality service for the American public. Health-care providers must consider distressing ethical issues raised in current worker-client relationships, such as confidentiality and assisted suicide. In addition, providers are increasingly being called on to justify their ethical positions to a questioning public.

But the ethical concerns facing social work reach well beyond the individual worker-client relationship. A recent Hastings Center report contained the following admonition:

> The professions are powerful shaping forces in our culture . . . They affect not only how individuals live and how institutions work, but also the way we think about how we should live and about the ends our social institutions should serve. They nurture particular values that are integral to our cultural heritage and to our way of life (13).

Given the societal and professional challenges just discussed, meeting this mandate becomes not just a job, but also a mission requiring the greatest dedication and the strictest adherence to the values and ethics long esteemed by the helping professions. However, in an increasingly pressured environment, these professions are in a particularly sensitive spot. As Reamer points out, "It would be myopic to urge social workers (for example) to pursue a mission that is not embraced in earnest by the broader American culture" (14). Until recently, signs that society was embracing the ethics and values underlying social work practice were vanishing. It can be argued that a primary value supporting the entire health and social care systems—the individual's right to basic health and social supports—has come under public scrutiny more now than at any time in the past. In the face of this challenge and the lack of cultural support, it becomes necessary for providers to actively justify not only their personal ethical stances, but the ethical stance of the entire profession as well.

Ethical justification is only one of many questions the American public is addressing to health-care professionals. Even louder, the public is posing questions of accountability. The days of passive public acceptance of professionals' pronouncements are over. More and more, each health-care provider is being called on to say exactly what he or she is doing, why, and whether the results measure up to a reasonable standard.

However, outcome measures, particularly long-term outcome measures, for most health-care interventions are difficult to construct and apply. Currently, the construction and application of such measures tends to vary greatly and to leave a mass of largely incomparable data. The challenges of accountability in health care are to achieve some consensus around expected outcomes; to rigorously and openly determine if the interventions result in the appropriate outcomes;

and to create enough scientific and programmatic flexibility to move quickly away from ineffective interventions. It is a challenge that must be met, particularly by nonmedical practitioners as the health-care system evolves. For example, Caputi notes that "by having to demonstrate continually the intrinsic value of social work in patient care, workers are on one hand placed in a defensive position but are on the other given the opportunity to achieve precision and clarity in defending their role" (15). For nonmedical providers, precision and clarity will go far to encourage the restructuring of the health-care system so that it is encompassed by an effective, efficient social well-being system.

In summary. The nation is searching for solutions to epidemic social and physical ills. Our rapidly changing political, social, and economic contexts establish an environment of urgency. Increasing numbers of people are suffering, and the nation's systems to care for the vulnerable must be adapted more quickly. The professional challenges to providers, including fiscal constraints, the call for ethical justification and accountability, and the increasing complexity of the system and the professions also create an atmosphere of urgency. Health-care providers must quickly and creatively deal with these professional issues without losing sight of their role in social and health-care reform.

Moving to a System of Social Well-Being

Kahn and Kamerman describe the domain of social services as a series of systems, each somewhat paralleling the medical-care system and including programs, services, and benefits "available by other than marketplace criteria and . . . [concerned with] the living standard and life experiences of the entire population" (16). These authors note six subunits of social services, including education, health, housing, income maintenance, employment, and "personal social services" (for example, family and child welfare, services for the aged and for adolescents, visiting homemakers, community care). Kahn and Kamerman argue articulately that the social services are "too big a 'glob' for one delivery system." "Indeed," they state, "there are six systems precisely because of the need for (labor) specialization and differentiation." They argue that the personal social services system is the domain of professional social work, just as the medical care system is the domain of physicians. However, they do note the need for systems linkages and overall planning.

Scholars, policy makers, planners, and administrators increasingly are focusing on such linkages and overall planning. Many envision a social-care model based on a comprehensive system designed to meet the social-care needs of an entire population. As Austin suggests, "emphasis on social care involves a short break with the therapy-oriented, one-to-one model of professional practice. Social care programs require a continuity of responsibility and access to multiple service resources, both of which require an organizational or multiorganizational framework rather than an individual practitioner" (7, page 29).

However, the current medical-care and social-care systems are plagued by serious organizational impediments to effectiveness and efficiency, such as duplication of services, lack of continuity and coordination, and substantial gaps in the requisite services for specific populations. The complexity, cost constraints, and social dislocations of this era signal that it is time to move toward a unified social well-being system which will encompass broad levels of integrated services accessible to and designed to meet the needs of all population groups regardless of age or special need. As we move into the next century we also should be moving toward a total care system that is dedicated not to the primacy of high-technology medical care, or of individual social casework, or of outpatient versus inpatient care, or of any particular constituent group, service setting, or provider type, but rather to the primacy of populations' well-being—a system which incorporates all the elements necessary to support individuals at the highest level of functioning that is economically feasible.

There are two important trends that, if nurtured, will have important implications for the nation's ability to create and sustain a social well-being system. Black notes that the first trend is increased acceptance by the general public that individuals can and do have influence over their health and, with the appropriate resources, can be active on their own behalf. The second trend is increased acceptance by the medical professions and public that "psychological and environmental stress has a negative effect on health" (17). Together, these trends create a public receptiveness to the concept of a well-organized, integrated system designed to enhance individual strengths, provide interventions at the earliest (and least costly) time, provide care at the least costly effective level, and address all the parameters of health promotion and disease prevention.

It is fashionable for those who are interested in seeing a program fail to adamantly proclaim that it will "break the bank." It is equally fashionable for those interested in seeing a program succeed to equally adamantly proclaim that it will save major amounts of money "in the long run." It has not been so fashionable to implement the kinds of demonstrations and rigorous cost-benefit evaluations which would provide a framework for continuing the dialogue and achieving some consensus. This role has been abdicated by all and must be picked up by the "helping" professions.

The dual dilemma of those individuals who call for transformation of the medically based health-care system into a socially based health-care system was well summarized by Rehr when she noted that

> There is no consensual support of the demonstrated value of a "bio-psycho-social" model of care which can be more efficient, less costly, most effective and more individualized than the medical care model of yesteryear. There is insufficient interest in the need to eradicate duplications and abuses of service, in their depersonalization, lack of continuity and coordination, or in addressing the major problem of the dearth of needed community-based social-health resources (18).

That there is no consensual support for demonstrated value and little interest in the social well-being model suggests several critical, primary roles for health-care professionals in addition to that of program developer and evaluator.

Additional Roles for Health Care Professionals. Although research abounds in medical care and increasing amounts of it are being implemented in social work and nursing arenas, the majority of health-care professionals are direct-service providers. To move the nation towards a new system of comprehensive care—a social well-being system—in the next decades, health-care providers must assume roles not traditionally associated with research and healing—the role of sentinel, the role of innovator and demonstrator, and the role of political activist. I deal with these new roles below and offer some steps by which we can at least begin to move toward a social well-being system.

Health-Care Providers as Sentinels. Within a system of social well-being, the sentinel role is critical. Such a system will be multitiered and complex. Information from direct-care practitioners, regardless of the setting in which they are working (acute hospital, community care programs, extended care facilities), will be instrumental in identifying breakdowns, gaps in inefficiencies in the system. Direct practitioners will be the first to recognize the effects of such flaws on their patients and clients and will need an organized, rapid method of documenting system failures.

The National Center for Social Policy and Practice is developing, with the School of Social Welfare at the University of California, Los Angeles, a prototype of an organized system to efficiently obtain direct-practice information at a grassroots level. The center was created in 1986 by the National Association of Social Workers for the purpose of linking the practice of social work with the development of social policy. The center and UCLA are developing the prototype practice information-gathering system in Mississippi, where the state has decided to use it initially to evaluate implementation of the new welfare reform program. The system will be such that it can be applied in any field of practice and will be geared to quickly identifying problems which need additional intervention. This will be the first of many such early-warning systems which health-care practitioners will have to develop to ensure the effectiveness of a social well-being system.

Health-Care Providers as Innovators. One of the substantial concerns about the current health and social service systems is the tremendous service gaps. Long-term care for the elderly and disabled is an outstanding and much-publicized example. A somewhat less recognized, albeit increasingly reported need is for community-based residential programs for the mentally retarded. The number of such residences currently available is insufficient; moreover, a new population of young retarded adults, the first graduates of the Education for All Handicapped Children Act (P.L.94-142), have begun adding to the pressure for community-based homes (19).

In addition to their traditional role as providers of service, health-care practitioners—acting in concert with researchers—will need to search particularly diligently and flexibly for new ways of organizing and providing services and care. They will need to be equally diligent in demonstrating the cost-benefit and cost-effectiveness of each new effort. We will not be able to move from a theoretical model to a functioning system absent this work. Today, there is frequently a significant gap between the research and practitioner communities in all of the health-care professions. It takes too long for the professions to disseminate well-researched information about new programs, and too frequently the dissemination is never adequate.

The effectiveness of a complex social well-being system will depend heavily on dissemination of innovation by a variety of approaches. An example of such an approach is the newly created National Institute of Mental Health Social Work Research Task Force. According to its chair, Dr. David Austin, and its project officer, Dr. Juan Ramos, one of the task force's priorities is to determine what impediments currently exist to adequate dissemination of social work research and what might be done to facilitate the process (personal communication). This is a step which needs to be taken by all of the social and health-care professions. In addition, it is critical that recommendations for facilitating dissemination be implemented with high priority.

Health-Care Providers as Political Activists. As noted above, health-care practitioners are in good positions to assess directly the impact of social and health-care policy on their patients and clients. Although some health-care professionals maintain a strong political influence through statewide public information and lobbying efforts, rapid flux in the health-care system has necessitated emphasis on primarily professional issues such as credentialing and reimbursement. Because of the proximity of practitioners and health and social service consumers, it is essential that providers organize around service delivery issues as well as professional maintenance. To be most effective in this arena, professional coalitions are required for action. As Kane points out, "the goal is a system of care that is effective, humane, accessible, of high quality, and no more costly than necessary. . . . The perspective needed goes beyond agency or discipline to the 'big picture' " (20).

In summary, a transition to a comprehensive, effective social well-being system requires that practitioners take on roles—sentinel, innovator, political activist—not traditionally associated with direct service. As epidemic social and physical illnesses sweep the nation and as budget cuts threaten programs and providers, a better organized, more complete, and encompassing system is needed to provide all populations with the supports and services associated with social well-being. A social well-being model of care should move us toward providing the citizens of the next century with much of the caring and compassion felt to be absent now.

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Can Ethics Be Taught? An Essay

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In the last twenty years medical ethics has become a public enterprise. No longer is it a private affair between patient and physician. The most complex ethical issues are now debated in the media, the courts, and the legislature. Few topics have generated such widespread interest or posed such complex and multitudinous quandaries. It is now abundantly clear that physicians are called upon to exercise the skills of ethical analysis in almost every case of serious illness.

As a result of all of this, medical ethics has now become part of the curriculum in the majority of American medical schools, and increasingly in medical schools around the world. Despite this, medical school deans, faculty members, and practitioners remain skeptical. They seriously doubt the efficacy and utility, and even the possibility, of teaching professional ethics. They pose a series of difficult questions that have not been answered to their satisfaction: Ethics, they say, should be taught before students come to medical school, in family, church, school, and college. It is too late when students enter medical school. Their characters are already formed. Moreover, there is no evidence that teaching ethics changes behavior. It diverts student interest, time, and effort from more serious subjects. In any case, whose ethics should be taught? In a world increasingly divided on the fundamental moral questions, how do we choose what to teach? Finally, the whole enterprise is frustrating. There is no objective test that will tell us what is ethical and what is not, in the way a blood pH tells us whether the patient is alkalemic or acidemic.

These criticisms must be taken seriously and confronted squarely. They are voiced by influential medical educators as well as their colleagues in schools of law and business. There is considerable misunderstanding about the nature of ethics, its possibilities and limitations beneath the central question—can ethics be taught? It is essential to dispel these misunderstandings because medical ethics is still not firmly seated in the curriculum. Mistaken opinions can impede its teaching and lead to its ejection from the curriculum, which would be disastrous for both physicians and patients.

In this essay I shall argue that medical ethics can and must be taught, that it is not too late to do so in medical school, and that, properly defined and with clear objectives in mind, medical ethics is effective, useful, and necessary in the education of today's and tomorrow's physicians.

What Is Ethics?

Since we all have some set of moral beliefs by which we live, we all believe we know what ethics is. Some think it is simply a personal statement of what we believe to be right and wrong, unassailable by argument since we all think differently. Others take ethics to be a professional code, or the way professional people should relate to each other. Others equate ethics with their religious beliefs or the cultural mores of their society. Finally, an increasing number equate ethics and obedience to the law of the land in which they reside.

Ethics relates to all of these things, but it is not identical with any of them. Ethics, as it is being taught in medical schools today, is a discipline with its own content, methodology, and literature, like any other branch of university study. Indeed, ethics properly considered is that branch of philosophy which concerns itself formally, systematically, and critically with the rightness and wrongness of human character and

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human acts. It seeks generalizable principles, rules, and duties which should guide the moral agent and his or her actions. It deals, therefore, with both right and good persons and acts. Its method is analytical, inquiring into the meaning of terms used in ethical statements, the logic of ethical arguments, and the identification of the presuppositions or axioms from which we begin, and on which we base our moral conclusions.

The Analytic Function. Ethics is not just a set of free assertions about what we think is right and good. Ethics begins when we give reasons for our moral beliefs or our judgment of the moral quality of a person or an act. Our reasons must be based in some ethical theory and some set of principles, or values, which must also be identified and justified. Thus, a thing may be legal, but not stand up to moral analysis; for example, slavery and segregation were once legal, but they have never been morally defensible. Although religion is an important source of moral beliefs, it is distinct from ethics. When we are willing to engage those with whom we disagree in rational explanation of what our religious beliefs are, we are in the field of theological ethics. Professional codes too are not synonymous with ethics. The Hippocratic Oath and Corpus abound in moral prescriptions and proscriptions, but nowhere are those given a philosophical or conceptual justification.

This is not to deny the importance of personal belief, religion, law, and codes or the moral weight they may carry for us. But such statements of moral resolve are not automatically self-justifying. They must, like all moral assertions, be examined critically and systematically and be given some rational basis. We have had 2500 years of medical morality—statements of self-imposed obligations the profession perceives to be in the interest of patients. But we have had only a few decades of medical ethics properly speaking—that is, of a discipline that builds the physician's obligations on firm philosophical grounds.

Up to this point I have described the analytical function of ethics, that portion that deals with making ethical decisions and resolving ethical dilemmas. There are two other functions of ethics, the descriptive and the normative.

The Descriptive Function. Descriptive ethics is the empirical arm of the discipline. It observes, codifies, and examines the moral values, decisions, and actions individuals and societies actually exhibit when they make moral choices. In this, descriptive ethics is closer in methodology to anthropology and sociology than to philosophy. It deals with what is rather than what ought to be, the latter being the concern of analytical and normative ethics. An example of descriptive ethics would be an empirical study of how doctors decide about do-not-resuscitate orders or the values families use in accepting or rejecting them.

The Normative Function. Normative ethics has as its goals deriving the principles, rules, and duties which should shape ethical conduct and decision-making. It attempts to define the right and good life in general or the right and good life in medicine in particular. Though there is much debate about whether universalizable moral norms are few or many, most ethicists hold that some things ought never be done and some things ought always be done. Ethical codes of professions are universalizable normative statements which define the boundaries of right and good professional conduct. The Hippocratic Oath is an example of normative ethics.

The Aims: Right Decisions and Good Character. These three functions of ethics have two aims: making a right and good decision or moral judgment and forming a good character. Virtue ethics—the ethics of character—dominated ethics for most of its history. It came to be neglected in postmedieval philosophy. Medical ethics particularly has focused increasingly on the solution of moral quandaries. But in recent years it is again being appreciated that the character of the physician and the patient cannot be excluded from the equation. How we choose to define a moral dilemma, what values we choose to resolve it, what principles we prefer over others, the kind of logic we favor, whether we are men or women—all may influence how we solve a particular moral dilemma. Ethics is now returning to a deeper, more sophisticated understanding of the moral agent. Virtue theory and its connections with principles and with moral psychology is one of the most active and interesting branches of ethical theory today.

Despite the emphasis on its analytic and prescriptive functions, ethics is eminently practical. It was so considered by Aristotle, who with Plato gave ethics its birth. Classically, ethics has aimed at the world of everyday life, at the way we should conduct ourselves with respect to our fellow humans and with society. Medical ethics in particular is tied to concrete and practical decisions. Physicians cannot speculate endlessly about what ought to be done. They must make a decision for, and in the interests of, their patients. Often they must do so in emergencies, when emotions, patience, anxiety, and danger are unavoidable. To label ethics as "abstract," "unrealistic," or "unnecessary" is not only to misunderstand the nature of ethics, but to opt for visceral reflexes and sentiment where as much rationality as possible is required. Indeed, the practice of ethics should be as orderly and rigorous as the process of differential diagnosis, and just as practical.

On the other hand, we must accept the fact that ethics is not experimental science. It has no laboratory method, no tools for quantitation, and no objective measuring instrument. This does not disqualify it as a discipline, any more than it disqualifies any of the humanistic studies—literature, language, history.

What Can Be Taught and What Cannot?

The Skills of Ethical Analysis. Clearly medical ethics is a cognitive discipline with its own methodology, terminology, literature, and critical apparatus, just like other humanistic disciplines. Like other university disciplines, therefore, it can be taught. Thus, most medical schools introduce their students to the skills of ethical analysis and reasoning. Emphasis is placed on the resolution of commonly encountered ethical dilemmas as they present themselves in actual cases. Students learn to analyze a case, identify ethical issues and problems, the principles at stake, ethical theory in use, and the assumptions behind the various positions taken. They then learn to make a decision about what the right and good action would be—giving their reasons and defending them against opposing positions.

These are all teachable cognitive skills. Students can be tested for what they have learned. This is usually done by examining the student's capacities to analyze a case in a systematic way. References to the literature, to ethical theories and principles, and to the way they determine moral choice are expected. Grades are given, as in other disciplines, on the basis of knowledge, organization of discussion, completeness and clarity of argument. The objective of ethics teaching is to provide that modicum of knowledge and skill needed to make bedside ethical decisions. By no means does this qualify the student as an ethicist. But neither does the course in biochemistry make medical students biochemists.

Virtue and Character. It is more difficult to evaluate whether the behavior of students as moral agents is influenced by courses in ethics. Critics assert that a course in ethics does not make one necessarily more ethical or more virtuous. This is true. One may have a knowledge of ethics, a cognitive grasp, but lack the motivation to do the right thing. No course could automatically close the gap between knowing what is right and doing it.

This does not mean that ethics cannot be taught at all, nor that virtue is entirely unteachable. In addition to the skills of ethical analysis, other objectives are attainable. For one thing, participation in a well-taught course forces students to come to grips with their own values and the origin and validity of those values. Nothing does this better than open discussion of why one has chosen one moral option in a crucial case rather than another. This cannot help but encourage moral maturation, even if the student did come to medical school with a well-ordered ethical education. Students, furthermore, are sensitized to ethical issues and problems. Experience in this kind of teaching reveals that only too often, students and faculty members may not even recognize a problem as ethical in nature. Finally, whatever the values students bring with them, these values must be assimilated, examined in the light of contravening opinion, and be made part of the self, be modified, or be rejected. This is not an invitation to the abandonment of received values. But without critical reflection our values cannot become our own; they remain merely parrotings of other people's opinions.

Few would argue that courses in ethics will make virtuous persons out of morally indifferent or morally vicious students. This is asking too much of formal teaching in ethics. To set expectations so unrealistically is to doom the teaching of ethics to failure. However, if we are willing to accept more limited goals, there are ways in which virtue can in fact be taught. The major effective method is the example of a virtuous person whom the student chooses as a model.

For medical students the model is usually some distinguished clinician, respected because he or she is, first, a superb physician. Nothing is more influential in the lives of conscientious medical students—no matter what their prior education or training in ethics may have been. Medical students, by and large, want to be "good" physicians, expert in the craft, knowledgeable in the science, and committed to humane purposes. Precisely what defines a "good" physician is not found in lectures on the subject. The picture is filled in only gradually, over the years of training, by observing good and bad models among teachers, colleagues, and practitioners.

This desire to be a good physician opens an opportunity to modify student behavior. Most sociological studies of medical student professionalization have emphasized the damaging effects of a medical education on idealism and compassion. Very few have documented the good influences that must have been present for some students at least. All physicians, after all, do not turn out to be the insensitive, narrowly educated, authoritarian, money-seeking stereotypes so roundly and enthusiastically denounced by medicine's critics. The fact is that clinical faculty members do have an enormous responsibility for the character formation of their students and house staff. The impact of such teachers is difficult to quantitate, but it is a genuine factor, as any physician who reflects on his or her own development as a doctor knows. Many of our habits as physicians and what we consider "good" medicine are traceable to imitation or rejection of some teacher's example.

In any case, there is unwarranted pessimism in concluding that one's students are beyond our influence. This is a species of moral defection from the duties of a teacher. Most clinical teachers try to influence their young protégés. This is for many an attraction of a teaching career. Moreover, who would teach if they did not believe that some students can be moved to modify their ways of thinking or their behavior?

The reasonable attitude of teachers should be one of realistic, and therefore modest, expectation from ethics as a way of teaching virtue. Some students will, no doubt, be beyond any influence; others will be only too malleable. Most will be susceptible to incremental changes. With each group the clinical teacher, and collectively the medical school faculty, has a responsibility to give more conscious attention to the "formation" of the young physician's character. To expect too much of the teaching of ethics is to doom it to failure. To expect too little is to miss an opportunity, and thus to defect on a responsibility which, like it or not, is thrust on clinical teachers.

Some Objections and Alternatives

Selecting "Humanistic" Students or Humanities Majors? Some would argue that a much more effective way to improve the ethical character of future physicians and to assure their sensitivity and compassion is to select more specifically for "humanistic" qualities or to favor students who major in the humanities. Both are illusory. Even if we could make reliable predictions of future behavior, it would patently be a mistake to assume that character formation stops at entry into medical school. Moral maturity is an evolving process, never fully finished.

There is no proven bias-free method for selecting "humanistic" students or students with "good character." When we apply such criteria to admission interviews, we may well delude ourselves. Pretty soon "humane" students will begin to look like the members of the interviewing team. Few humans are able to free themselves of their own definitions of humaneness. Most are eager to judge humaneness in others. Indeed, to introduce such a criterion is to invite dangerous judgments. Those who interview medical school applicants have no special capacity to make such judgments. The dangers of discrimination are all too obvious.

Another illusory solution is selecting students with humanities majors. Neither courses in ethics nor courses in the humanities will make a person humane. Some of the world's greatest humanists were quite repulsive human beings. Moreover, let the word be out that medical schools are seeking humanities majors, and undergraduates will swarm into courses in literature, philosophy, or history with the same avidity they previously exhibited for science. In both cases, the end result is exposure without contagion. Who has not interviewed majors in either science or humanities to find that the student's enthusiasm for and grasp of the major is minimal? Rather, utility for admission all too often turns out to be the motivating factor in the choice of undergraduate courses and majors.

When Should Ethics Courses Be Taken? The argument is often made that medical school is not the place to teach ethics. This is the responsibility of the colleges. Medical schools ought to require an ethics course for admission, but should not teach it. Certainly, it would be salutary for undergraduate college students to take courses in ethics, but not just for admission to medical school. A knowledge of how to make moral judgments is essential to a liberal education.

But even if students have had such courses, there is much value to teaching medical ethics in medical school. First, the medical school course will reinforce what has been taught. But most important of all, teaching ethics in medical school does several things not possible in a college ethics course. One is to make the connection between general and special ethics, between abstract theory and application in concrete clinical cases. Another is to emphasize that ethics is as much a part of being a clinician as biochemistry or physiology. Instead of taking time and interest from the "basic" courses, as some critics maintain, teaching ethics simply affirms what should be obvious, that in clinical medicine, technical and scientific decisions must be made within certain ethical boundaries or they are injurious to patients and society.

Ethics provides the substratum of moral values without which science and technology may become injurious to society. A crucial question in a technological society is how to use technical know-how for humane purposes. Of the many things we can do, which should be done and which should never be done? Recent experience with research fraud, the competition for patents on genetic biotechnology, the increasing destruction of the environment, and the uncomfortably close relationships between universities and business all point to the need for ethical constraints.

Other Illusions about Criteria for Admission. There are a number of other illusions about the criteria for admission that need critical reflection. One is the penchant for the "well-rounded" student, the one who has dipped into many things, from athletics to student politics. To be sure, these are important arenas for student expression and development. They are not to be denigrated nor ignored. But the correlation between these attributes and the qualities of compassion, humanity, or character in the physician's mature years is remote at best. The same is true of the conviction that "grinds" make poor doctors, or that there is some inverse relationship between intelligence and sensitivity to human beings.

The plain fact of the matter is that medical school applicants are a biopsy of educated Americans, that it is precarious to extrapolate from qualities exhibited by people in their early twenties to the character of a physician later in life. The ways in which a person may function as a physician are manifold. Short of moral turpitude, medicine can accommodate a wide range of personalities. The challenge to which medical schools and residency programs rarely direct themselves is to match the capabilities and interests of student or resident with a field in medicine.

Economy in Our Pretensions

So far as preparation for medical school is concerned (and with the ethical perspective in mind), the most sensible approach is to encourage students to major in whatever interests them, to do well in what they have chosen, and to avoid fads and fancies about what best prepares a student for a career in medicine. Medical schools for their part should give equal preference to science, social science, or humanities majors. They should favor neither one nor the other in the uncertain hope that some set of courses will be more conducive to being a good physician than others.

I have argued that medical schools and their faculties have a significant influence on the ethical behavior of their protégés. But some economy of pretensions is in order. Students do bring values with them, do bring characters in the process of formation, and do have different capabilities, interests, and enthusiasms. Medical schools cannot and should not try to shape their students in the image of some supposed ideal physician. Students are in medical school for only four years, and in residency for about the same amount of time. We should attribute neither too little nor too much influence to our efforts. Admittedly, these are crucial years for the formation of physicians. But what went before, and more important what comes later in life, must not be discounted.

This being the case, it seems irresponsible to blame the medical school for all the ills of personality and character physicians may later exhibit. Nor is it tenable for the miscreant physician to blame the medical school for his or her failings. One thing a course in ethics would instil is that humans are moral agents, responsible and accountable for their own actions. Each of us is under obligation to resist seduction by money, power, prestige, or glamour. If we succumb, the problem is with us and not with our medical school, our teachers, or our society.

Conclusion

Can ethics be taught? I have answered in the affirmative. The criticisms leveled against the possibility or utility of such teaching derive from a misunderstanding of what ethics is, what it can teach and what it cannot, and the illusory nature of substitutes for such teaching. Ethical decisions are intrinsic to every important clinical decision. Physicians should have as much familiarity with the cognitive skills involved in the analysis of an ethical issue and the making of ethical judgments as they do of other branches of medicine. Medical ethics is not outside medicine, it is intrinsic to it and always has been.

Medical ethics as a cognitive discipline can be taught. But some progress can also be made in the far more important realm of the physician's character. Medical school and the faculty need to recognize their responsibilities to make the teaching of ethics as sound as possible and pay more attention to the inculcation of the right moral attributes in those they educate.

Subject, Author, and Title
Index to Volume 56

THE MOUNT SINAI JOURNAL OF MEDICINE
Vol. 56, No. 6, 1989
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Subject, Author, and Title Index to Volume 56

Acid base, alkalosis, metabolic, 56(2):126–128
Actinomycosis, pulmonary, in HIV infection, 56(4):300–303
Activity of pp60$^{c\text{-}src}$ protein kinase in human breast cancer tissue, Lehrer S, O'Shaughnessey J, Song H, Levine E, Savoretti P, Dalton J, Lipsztein R, Kalnicki S, Bloomer W, 56(2):83–85
Acute thrombosed external hemorrhoids, Oh C, 56(1):30–35
Administrative leadership, 56(6):429–434
Age-based entitlements to health care: what are the limits? Moody H, 56(3):168–175
AIDS, AMA position on, 56(3):250–251; duty to treat, 56(3):250–264; and history of epidemics in US, 56(3): 223–229; and pandemics, ethics of, 56(3):242–245; tuberculous pancreatic abscess in, 56(4):297–299
AIDS: the state of the New York State approach, Axelrod D, 56(3):238–241
AIDS: the challenge to the press, Eckholm E, 56(3):230–232
AIDS: epidemiology and treatment issues, Strain J, Fahs M, Fulop G, Sacks H, 56(3):233–237
Albendazole in the conservative management of multiple hydatid disease, Golematis B, Lakiotis G, Persidou-Golemati P, Bonatsos G, 56(1):53–55
Alfentanil and midazolam: new anesthetic drugs for continuous infusion and an automated method of administration, Reves J, Glass P, Jacobs J, 56(2):99–107
Altchek A: see Bloch C
Amiodarone hepatotoxicity: progression from steatosis to cirrhosis, Bach N, Schultz BL, Cohen LB, Squire A, Gordon R, Thung SN, Schaffner F, 56(4):293–296
Anesthetics: alfentanil, 56(2):99–107; fentanyl, 56(2):93–96; midazolam, 56(2):99–107
Annas G: Gift of life: dilemmas in organ transplantation, 56(5):395–405
Aortic aneurysm, 56(4):315–317
Aortic graft-enteric fistula and paraprosthetic-enteric fistula: a review, Wagner R, 56(2):150–156
Aronson S: The Klemperer legacy, 56(5):347–350
Arterial flow in venous volume studies, Peirce EC II, Schanzer H, 56(1):41–45
Asbestos-associated rounded atelectasis: a case report and review of the literature, Franzblau A, 56(4):321–325
Assessment of synthetic media for in vitro fertilization, Demir R, 56(2):141–146
Atelectasis, and asbestos, 56(4):321–325
Aufses AH Jr: Residency training programs then and now: surgery, 56(5):367–369
Axelrod D: AIDS: the state of the New York State approach, 56(3):238–241
Axillary vein thrombosis as the initial symptom in metastatic papillary carcinoma of the thyroid, Sirota D, 56(2):111–113

Bach N, Schultz BL, Cohen LB, Squire A, Gordon R, Thung SN, Schaffner F: Amiodarone hepatotoxicity: progression from steatosis to cirrhosis, 56(4):293–296
Barron DM: see Donofrio MT
Bauer J: see Frexes Keusch C
Baumrin B: Ethics of pandemics, 56(3):242–245
Bazell R: Gift of life: dilemmas in organ transplantation, 56(5):395–405
Berlatzky Y: see Katz G
Berson BD, Mendelson DS, Janus CL: Tuberculous abscess of the pancreas in AIDS: CT findings, 56(4):297–299
Biller H: see Bleiweiss I
Bleiweiss I, Harpaz N, Strauchen J, Wagner R, Biller H: Functioning lipoadenoma of the parathyroid: case report and literature review, 56(2):114–117
Bloch C, Altchek A, Levy-Ravetch M: Sonography in early pregnancy: the significance of subchorionic hemorrhage, 56(4):290–292
Blood flow, arterial, 56(1):41–45; hepatic, 56(1):33–35
Bloomer W: see Lehrer S
Blustein J: Rights approach and the intimacy approach, the: family suffering and defective newborns, 56(3):164–167
Bonatsos G: see Golematis B
Bosch SJ, Deuschle KW: Social work: an important component of community medicine at the Mount Sinai School of Medicine, 56(6):459–467
Bove A: see de la Sierra A
Boyer W, Feighner J: An overview of fluoxetine, a new serotinin-specific antidepressant, 56(2):136–140
Boyle T, Kim U: Surgical alternatives for the treatment of nonparasitic liver cysts, 56(2):90–92
Brachman M: see Wallace DJ
Brain tumor, cerebellar, 56(1):56–58
Breast cancer, diagnosis, 56(2):83–85
Burrows L: Criteria for transplantation: a physician's perspective, 56(3):197–201; Gift of life: dilemmas in organ transplantation, 56(5):395–405

Calcium channel blocker, verapamil, 56(2):93–96
Can ethics be taught? Pellegrino EP, 56(6):490–494
Caplan AL, Annas G, Bazell R, Burrows L, Miller C, Swazey J: Gift of life: dilemmas in organ transplantation, 56(5): 395–405
Caplan AL: Hard data on efficacy: the prerequisite to hard choices in health care, 56(3):185–190
Carcinoma, thyroid, 56(2):111–113
Cardellach F: see de la Sierra A
Cardiomyopathy, cardiac stress in, 56(4):285–289
Cardiopulmonary resuscitation: qualifications and performance of housestaff and trained internists, Donofrio MT, Barron DM, Winters SL, Gomes JA, Gorlin R, 56(4):279–284
Carlton TO: Education for health social work practice: reconciling past, present, and future, 56(6):468–471
Carrera MA: Reflections on community health education: a program that is working, 56(6):472–477
Casavilla A: see Torino F
Cerebellar tumor causing hypertensive crisis and stimulating pheochromocytoma and Cushing's syndrome, Yagil Y, Futterweit W, Krakoff LR, Rubin H, Weinrauch H, 56(1):56–58
Chalmers TC, photograph, 56(5):363

Chiang H: see Griffin R
Child hyperthermia, 56(2):123–125
Choices in surgical treatment of rigid neurogenic and arthrogrypotic club feet, Lichtblau S, 56(1):17–22
Clinical data on efficacy and health-care choices, 56(3):185–190
Cobo E: see de la Sierra A
Cohen LB: see Bach N
Cohen ML: see Reichenthal E
Columbus and Copernicus, Lamm RD, 56(1):1–10
Community medicine and social work, 56(6):459–467
Compliance, 56(6):453–458
Computerization, in health social work, 56(6):440–446
Computerized tomography and magnetic resonance imaging in a case of spinal dysraphism, Lusins J, Elting J, Sachdev V, 56(2):133–135
Confronting the challenge of computerization for social workers in health care settings, Epstein I, Mutschler E, 56(6):440–446
Cost containment and justice, Daniels N, 56(3):180–184
Coulton CJ: Quality care assurance reexamined, 56(6):435–439
Criteria for transplantation: a physician's perspective, Burrows L, 56(3):197–201
CT in spinal dysraphism, 56(2):133–135
Cuzzo-Kriner MR: Intestinal endometriosis and its complications: case report and review, 56(4):334–337

Dalton J: see Lehrer S
Dana B: see Rosenberg G
Daniels N: Cost containment and justice, 56(3):180–184
De la Sierra A, Cardellach F, Cobo E, Bove A, Roige M, Santos MJ, Ingelmo M, Urbano-Marquez A: Iatrogenic illness in a department of general internal medicine: a prospective study, 56(4):267–271
Defective newborns and family rights, 56(3):164–167
Demir R: Assessment of synthetic media for in vitro fertilization, 56(2):141–146
Deuschle KW: see Bosch SJ
Diagnosis, breast cancer, 56(2):83–85; cerebellar tumor, 56(1):56–58; hepatoma, 56(1):33–35; sarcoidosis, 56(1):59–61; synovitis, 56(1):46–52; venous volume, 56(1):41–45
Diakoumakis EE: see Weinberg B
Diffuse neurofibroma of the pylorus: a cause of gastric outlet obstruction, Waxman J, Kim U, Subietas A, Vuletin J, Waxman M, 56(2):129–132
Dimich I: see Griffin R
Donabedian A, Eisenberg J, Gellhorn A, Lohr K, Veatch R: Quest for quality health care: whose choice? whose responsibility? 56(5):406–422
Donofrio MT, Barron DM, Winters SL, Gomes JA, Gorlin R: Cardiopulmonary resuscitation: qualifications and performance of housestaff and trained internists, 56(4):279–284
Dramatic response of pulmonary metastasis from prostatic cancer to LH-RH agonist treatment, Heyman J, Leiter E, 56(2):108–110
Dumitrescu O: see Jagirdar J
Dunne R: Duty to treat AIDS patients: a patient advocate's perspective, 56(3):252–253
Duty to treat AIDS patients: a patient advocate's perspective, Dunne R, 56(3):252–253
Duty to treat AIDS patients: a philosopher's perspective, Preus A, 56(3):254–258
Duty to treat AIDS patients: a physician-lawyer's perspective, Zinberg J, 56(3):259–264
Duty to treat AIDS patients: 1988 AMA position, Patterson R, 56(3):250–251
Dysraphism, spinal, 56(2):133–135

Eckholm E: AIDS: the challenge to the press, 56(3):230–232
Economics, health care, and ethics, 56(3):194–196
Economist looks at the future of health policy, an, Muller C, 56(6):447–452
Educational process at the Mount Sinai School of Medicine: The first 25 years, Stimmel B, 56(5):375–382
Education for health social work practice: reconciling past, present, and future, Carlton TO, 56(6):468–471
Eid A: see Katz G
Eisenberg J: Quest for quality health care: whose choice? whose responsibility? 56(5):406–422
Eisenkraft J: see Schwartz N
Elting J: see Lusins J
Endogenous *Klebsiella* endophthalmitis: case report and literature review, Glassman RM, Lieberman TT, Friedman AH, Fuchs W, Meltzer MA, Gabrilove L, 56(4):326–329
Endometriosis, intestinal, 56(4):334–337
Endophthalmitis, *Klebsiella,* 56(4):326–329
Enterocolitis, necrotizing, 56(4):330–333
Environmental Medicine Notes, Alf Fischbein, ed: Franzblau A: Asbestos-associated rounded atelectasis: a case report and review of the literature, 56(4):321–325
Epidemics, in US history, 56(3):223–229
Epstein I, Mutschler E: Confronting the challenge of computerization for social workers in health care settings, 56(6):440–446
Ethics and economics: implications for primary care training, Fahs M, 56(3):194–196
Ethics in medicine, 56(3):157–259; teaching of, 56(6):490–494
Ethics of pandemics, Baumrin B, 56(3):242–245

Fahs M: Ethics and economics: implications for primary care training, 56(3):194–196; see Strain J
Feighner J: see Boyer W
Feldman G: see Wallace DJ
Fever caused by leaking abdominal atherosclerotic aortic aneurysm, Katz G, Eid A, Rivkind A, Berlatzky Y, 56(4):315–317
Fibromatosis, 56(4):318–320
Fischbein A, ed, Environmental Medicine Notes, 56(4):321–325
Fistula, enteric, 56(2):150–156
Fletcher RH: Patients' compliance with therapeutic advice: a modern view, 56(6):453–458
Fluoxetine, 56(2):136–140
Fox D: History of responses to epidemic disease in the United States since the 18th century, 56(3):223–229
Franzblau A: Asbestos-associated rounded atelectasis: a case report and review of the literature, 56(4):321–325
Frexes Keusch C, Bauer J: Mesenteric fibromatosis in Gardner's syndrome, 56(4):318–320
Friedman AH: see Glassman RM
Frydman C: see Jagirdar J
Fuchs W: see Glassman RM
Fulop G: see Strain J
Functioning lipoadenoma of the parathyroid: case report and literature review, Bleiweiss I, Harpaz N, Strauchen J, Wagner R, Biller H, 56(2):114–117
Futterweit W: see Yagil Y

Gabrilove L: see Glassman RM
Garaycoechea M: see Torino F
Garcia H: see Torino F
Gardner's syndrome, 56(4):318–320
Gastric secretion and sympathomimetics, 56(4):272–278
Gastric tumor, 56(2):129–132
Gelernt IM: see Keller RJ
Gelles J, photograph, 56(5):394
Gellhorn A: Quest for quality health care: whose choice? whose responsibility? 56(5):406–422
Giant-cell neoplasm of the sphenoid sinus, Suster G, Porges R, Tobias J, Nanes M, 56(2):118–122

Gift of life: dilemmas in organ transplantation, Caplan AL, Annas G, Bazell R, Burrows L, Miller C, Swazey J, 56(5):395–405
Gil O: see Torino F
Glassman RM, Lieberman TT, Friedman AH, Fuchs W, Meltzer MA, Gabrilove L: Endogenous *Klebsiella* endophthalmitis: case report and literature review, 56(4):326–329
Glass P: see Reves J
Gleicher N, ed, Reproductive Medicine Notes, 56(2):141–146
Glenn J, photograph, 56(5):363
Goal [of a new medical school], the, Popper H, Koffler D, 56(5):351–355
Goldman MD: see Stamler J
Golematis B, Tzardis P, Legakis N, Persidou-Golemati P: Overwhelming postsplenectomy infection in patients suffering from thalassemia major, 56(2):97–98
Golematis B, Lakiotis G, Persidou-Golemati P, Bonatsos G: Albendazole in the conservative management of multiple hydatid disease, 56(1):53–55
Gomes JA: see Donofrio MT
Gordon R: see Bach N
Gorlin R: see Donofrio MT
Gout, lipids in, 56(1):11–16
Graduate School of Biological Sciences: the first 25 years. An interview with Terry Krulwich. Krulwich T, Kupfer S, 56(5):383–391
Griffin R, Dimich I, Gurado R, Chiang H, Kaplan J: Hemodynamic effects of verapamil during fentanyl–nitrous oxide anesthesia, 56(2):93–96
Gurado R: see Griffin R

Hard data on efficacy: the prerequisite to hard choices in health care, Caplan A, 56(3):185–190
Harpaz N: see Bleiweiss I
Health care, delivery, 56(1):1–10, 56(3):191–193; economics, 56(6):447–452; economics, and training, 56(3):191–193; quality, 56(5):406–422; social well-being as aim, 56(6):483–489
Health education, 56(6):000–000
Hematoma, subdural, 56(1):68–70
Hemodynamic effects of verapamil during fentanyl–nitrous oxide anesthesia, Griffin R, Dimich I, Gurado R, Chiang H, Kaplan J, 56(2):93–96
Hemodynamics, 56(2):93–96
Hemorrhage, infratentorial intratumoral, 56(4):309–314; subchorionic, in early pregnancy, 56(4):290–292
Hemorrhoids, 56(1):30–35
Hepatic cysts, 56(2):90–92
Hepatoma, 56(1):33–35
Hepatotoxicity, amiodarone, 56(4):293–296
Heyman J, Leiter E: Dramatic response of pulmonary metastasis from prostatic cancer to LH-RH agonist treatment, 56(2):108–110
History of responses to epidemic disease in the United States since the 18th century, Fox D, 56(3):223–229
HIV, President's Commission on, 56(3):246–249; pulmonary actinomycosis in, 56(4):300–303
Hojman D: see Torino F
Hormone therapy, prostatic cancer, 56(2):108–110
Horowitz SF: see Stamler J
Housestaff and CPR, 56(4):279–284
Hsu MA: see Mulvihill M
Human disease processes and molecular biology, 56(5):392–394
Hydatid disease, therapy, albendazole, 56(1):53–55
Hyperthermia, in a child, 56(2):123–125

Iatrogenic illness in a department of general internal medicine: a prospective study, de la Sierra A, Cardellach F, Cobo E, Bove A, Roige M, Santos MJ, Ingelmo M, Urbano-Marquez A, 56(4):267–271
Ileocecal valve, liposarcoma, 56(1):62–64
Impact of molecular biology on understanding of the human disease process, Weinberg RA, 56(5):392–394
Inaugural address, Rowe JW, 56(5):423–426
Infratentorial intratumoral hemorrhage, Reichenthal E, Rubinstein AB, Cohen ML, 56(4):309–314
Ingelmo M: see de la Sierra A
Internists and CPR, 56(4):279–284
Intestinal endometriosis and its complications: case report and review, Cuzzo-Kriner MR, 56(4):334–337
In vitro fertilization, synthetic media, 56(2):141–146
Ions, calcium, 56(2):93–96
Isolated dislocation of the radial head: three cases and review, Sturm PF, Levine J, Sedlin ED, Ulin RI, 56(4):304–308
Issues in Medical Ethics: 1. justice and medical care 2. AIDS: crisis for medical ethics, Moros DA, Rhodes R, eds, 56(3):157–259

Jacobs J: see Reves J
Jagirdar J, Frydman C, Sakurai H, Dumitrescu O: Mesothelial papillary proliferation of the pleura associated with radiation therapy: does it have a role in the pathogenesis of mesothelioma? 56(2):147–149
James G, photograph, 56(5):363
Janus CL: see Berson BD
Jhaveri MK: see Weinberg B
Journal, Mount Sinai, 1989 list of reviewers, 56(6):503; Student Prize 1989, Schorr-Lesnick B, Lung function and health attitudes and habits in professional wind musicians and vocalists, 55(4):346–352
Justice and cost containment, 56(3):180–184
Justiniani F: Sarcoidosis complicating primary Sjogren's syndrome, 56(1):59–61

Kahn T: see Weizman H
Kalnicki S: see Lehrer S
Kamm FM: Report of the US task force on organ transplantation: criticism and alternatives, 56(3):207–220
Kaplan J: see Griffin R
Kaplan KO: Social well-being: the future of the social and health care systems, 56(6):483–489
Kase N: see Niss B
Katz G, Eid A, Rivkind A, Berlatzky Y: Fever caused by leaking abdominal atherosclerotic aortic aneurysm, 56(4):315–317
Kaufman KR, ed, Psychiatry Notes, 56(2):136–140
Keller RJ, Salky BA, Gelernt IM: Mucosal proctectomy and ileoanal anastomosis, 56(1):36–40
Kim U: see Boyle T; see Lee HK; see Waxman J
Klapholz A, Talavera W, Rorat E, Salsitz E, Widrow C: Pulmonary actinomycosis in a patient with HIV infection, 56(4):300–303
Klebsiella, endophthalmitis, 56(4):326–329
Klemperer legacy, the, Aronson S, 56(5):347–350
Klinenberg JR: see Wallace DJ
Krakoff LR: see Yagil Y
Krulwich T, Kupfer S: Graduate School of Biological Sciences: the first 25 years. An interview with Terry Krulwich, 56(5):383–391
Kupfer S, ed, Mount Sinai School of Medicine: 25 years, 56(5):345–426; see Krulwich T

Lakiotis G: see Golematis B
Lamm RD: Columbus and Copernicus, 56(1):1–10
Leddomado E: see Mendez IB
Lee B: President's Commission on HIV: a personal report on related ethical and moral issues, 56(3):246–249
Lee HK, Skarzynski J, Kim U: Value of hepatic blood flow study in the diagnosis of hepatoma, 56(1):33–35
Legakis N: see Golematis B
Legislative issues in delivering health care, Tallon J, 56(3): 191–193

Lehrer S, O'Shaughnessey J, Song H, Levine E, Savoretti P, Dalton J, Lipsztein R, Kalnicki S, Bloomer W: Activity of pp60$^{c\text{-}src}$ protein kinase in human breast cancer tissue, 56(2):83–85
Leiter E: see Heyman J
Levine E: see Lehrer S
Levine J: see Sturm PF
Levy-Ravetch M: see Bloch C
Lichtblau S: Choices in surgical treatment of rigid neurogenic and arthrogrypotic club feet, 56(1):17–22
Lieberman TT: see Glassman RM
Lipid studies in primary gout, Yu T, Oreskes I, 56(1):11–16
Lipoadenoma, parathyroid, 56(2):114–117
Liposarcoma of the ileocecal valve: a case report, Wood DL, Morgenstern L, 56(1):62–64
Lipsztein R: see Lehrer S
Liver, transplantation, in children, 56(1):71–76
Lohr K: Quest for quality health care: whose choice? whose responsibility? 56(5):406–422
Lusins JO, Elting J, Sachdev V: Computerized tomography and magnetic resonance imaging in a case of spinal dysraphism, 56(2):133–135
Lusins JO, McChesney JD: Nonsurgical management of an isolated interhemispheric subdural hematoma sequentially followed by CT, 56(1):68–70

McChesney JD: see Lusins JO
Machac J: see Stamler J
Magee DF: The role of sympathetic innervation and sympathomimetics in gastric secretion in vivo, 56(4):272–278
Maintenance of metabolic alkalosis despite saline administration in the presence of ascites, Weizman H, Kahn T, 56(2):126–128
Malignant hyperthermia in a child with sleep apnea, Schwartz N, Eisenkraft J, 56(2):123–125
Management, hemorrhoids, 56(1):30–35; hydatid disease, 56(1):53–55; nonsurgical, hematoma, 56(1):68–70; Zollinger-Ellison syndrome, 56(4):338–342
Matza D: see Stamler J
Medical ethics, 56(3):157–259; teaching of, 56(6):490–494
Medical social work, education for, 56(6):468–471
Medicine, residency training, 56(5):370–374
Mellin H, photograph, 56(5):394
Meltzer MA: see Glassman RM
Mendelson DS: see Berson BD
Mendez IB, Leddomado E: Orthotopic liver transplantation in children, 56(1):71–76
Mesenteric fibromatosis in Gardner's syndrome, Frexes Keusch C, Bauer J, 56(4):318–320
Mesothelial papillary proliferation of the pleura associated with radiation therapy: does it have a role in the pathogenesis of mesothelioma? Jagirdar J, Frydman C, Sakurai H, Dumitrescu O, 56(2):147–149
Mesothelioma and radiation therapy, 56(2):147–149
Midazolam, 56(2):99–107
Miller C: Gift of life: dilemmas in organ transplantation, 56(5):395–405
Model for leadership in administrative practice, a, Simmons WJ, Bixby NB, 56(6):429–434
Molecular biology and human diseases, 56(5):392–394
Mollin J: see Weinberg B
Moody H: Age-based entitlements to health care: what are the limits? 56(3):168–175
Morgenstern L: see Wood DL
Moros DA, Rhodes R, eds, Issues in Medical Ethics 1. justice and medical care 2. AIDS: crisis for medical ethics, 56(3):157–259
Moskowitz N: Systemic lupus erythematosus of the central nervous system: 2. Molecular theories and models for mental disease, 56(1):23–29
Mount Sinai School of Medicine: 25 years, Sherman Kupfer, ed, 56(5):345–426
MRI in spinal dysraphism, 56(2):133–135
Mucosal proctectomy and ileoanal anastomosis, Keller RJ, Salky BA, Gelernt IM, 56(1):36–40
Muller C: An economist looks at the future of health policy, 56(6):447–452
Mulvihill M, Reshen AB, Hsu MA: Social risk indicators for poor adjustment to nursing home placement, 56(6):478–482
Mutschler E: see Epstein I
Muyskens J: Procurement and allocation policies: should receiving depend on willingness to give? 56(3):202–206

Nanes M: see Suster S
Neoplasm, giant cell, 56(2):118–122
Neurofibroma, gastric, 56(2):129–132
New directions in the management of Zollinger-Ellison syndrome, Zuckerman S, 56(4):338–342
Niss B, Kase N: Overview of the history of the Mount Sinai School of Medicine (CUNY) 1963-1988, 56(5):356–366
Nonsurgical management of an isolated interhemispheric subdural hematoma sequentially followed by CT, Lusins JO, McChesney JD, 56(1):68–70
Nursing home, social risks for patients in, 56(6):478–482

O'Shaughnessey J: see Lehrer S
Oh C: Acute thrombosed external hemorrhoids, 56(1):30–35
Ophthalmology Notes, Keith M. Zinn, ed: Glassman RM, Lieberman TT, Friedman AH, Fuchs W, Meltzer MA, Gabrilove L: Endogenous *Klebsiella* endophthalmitis: case report and literature review, 56(4):326–329
Oppenheimer B, photograph, 56(5):346
Oreskes I: see Yu T
Orthopedics: club feet, 56(1):17–22
Orthotopic liver transplantation in children, Mendez IB, Leddomado E, 56(1):71–76
Ottenberg R, photograph, 56(5):346
Overview of the history of the Mount Sinai School of Medicine (CUNY) 1963–1988, Niss B, Kase N, 56(5):356–366
Overview of fluoxetine, a new serotinin-specific antidepressant, Boyer W, Feighner J, 56(2):136–140
Overwhelming postsplenectomy infection in patients suffering from thalassemia major, Golematis B, Tzardis P, Legakis N, Persidou-Golemati P, 56(2):97–98

Pancreas, abscess, in AIDS, 56(4):297–299
Pancreatic duct occlusion in the management of acute necrotizing pancreatitis in a canine model, Torino F, Gil O, Garaycoechea M, Garcia H, Casavilla A, Shenk C, Hojman D, 56(2):79–82
Pancreatitis, acute necrotizing, 56(2):79–82
Paraprosthetic and aortic graft, enteric fistula, 56(2):150–156
Patients' compliance with therapeutic advice: a modern view, Fletcher RH, 56(6):453–458
Patterson R: Duty to treat AIDS patients: 1988 AMA position, 56(3):250–251
Peirce EC II, Schanzer H: Arterial flow in venous volume studies, 56(1):41–45
Pellegrino EP, Can ethics be taught? 56(6):490–494
Peralta VE: see Weinberg B
Peripartum cardiomyopathy: a role for cardiac stress determinants other than pregnancy? Stamler J, Horowitz SF, Goldman ME, Matza D, Machac J, 56(4):285–289
Persidou-Golemati P: see Golematis B
Photographs: Berson SA, 56(5):359; Chalmers TC, 56(5):363; Gelles J, 56(5):394; Glenn J, 56(5):363; James G, 56(5):363; Mellin H, 56(5):394; Oppenheimer B, 56(5):346; Ottenberg R, 56(5):346; Popper H, 56(5):363; Rosenberg MM, 56(5):359; Rowe JW, 56(5):363; Seldin D, 56(5):359; Sohval A, 56(5):346; Steinbach M, 56(5):359; Unger AC, 56(5):394; Surgical rounds in Charles A. Wimpheimer Ward, 56(5):391
Popper H, photograph, 56(5):363

Popper H, Koffler D: The goal [of a new medical school], 56(5):351–355
Porges R: see Suster S
Pregnancy and subchorionic hemorrhage, 56(4):290–292
President's Commission on HIV: a personal report on related ethical and moral issues, Lee B, 56(3):246–249
Procurement and allocation policies: should receiving depend on willigness to give? Muyskens J, 56(3):202–206
Prostatic cancer, hormone therapy, 56(2):108–110
Protein kinase activity in breast cancer, 56(2):83–85
Psychiatry Notes, Kenneth R. Kaufman, ed: Boyer W, Feighner J: An overview of fluoxetine, a new serotinin-specific antidepressant, 56(2):136–140
Psychopharmacology: antidepressants, fluoxetine, 56(2):136–140
Pulmonary actinomycosis in a patient with HIV infection, Klapholz A, Talavera W, Rorat E, Salsitz E, Widrow C, 56(4):300–303

Quality care assurance, Coulton CJ, 56(6):435–439
Quantitative computerized joint scanning in rheumatoid arthritis: an accurate reproducible method of quantitating synovitis—preliminary report, Wallace DJ, Brachman M, Feldman G, Reichman R, Klinenberg JR, 56(1):46–52
Quest for quality health care: whose choice? whose responsibility? Donabedian A, Eisenberg J, Gellhorn A, Lohr K, Veatch R, 56(5):406–422

Rabinowitz JG, ed, Radiologic Notes, 56(4):330–333
Radial head dislocation, 56(4):304–308
Radiation therapy and mesothelioma, 56(2):147–149
Radiologic Notes, Jack G. Rabinowitz, ed: Weinberg B, Peralta VE, Diakoumakis EE, Shah KD, Mollin J, Jhaveri MK, Seife B: Sonographic findings in necrotizing enterocolitis with paucity of abdominal gas, 56(4):330–333
Reflections on community health education: a program that is working, Carrera MA, 56(6):472–477
Rehr H: Social implications of health care in contemporary perspectives: essays in honor of Helen Rehr, 56(6):427–494
Reichenthal E, Rubinstein AB, Cohen ML: Infratentorial intratumoral hemorrhage, 56(4):309–314
Reichman R: see Wallace DJ
Report of the US task force on organ transplantation: criticism and alternatives, Kamm FM, 56(3):207–220
Reproductive Medicine Notes, Norbert Gleicher, ed: Demir R: Assessment of synthetic media for in vitro fertilization, 56(2):141–146
Reshen AB: see Mulvihill M
Residency training programs then and now: medicine, Teirstein A, 56(5):370–374
Residency training programs then and now: surgery, Aufses AH Jr, 56(5):367–369
Reves J, Glass P, Jacobs J: Alfentanil and midazolam: new anesthetic drugs for continuous infusion and an automated method of administration, 56(2):99–107
Reviewers, 1989, *Mount Sinai Journal,* list of, 56(6):000
Rheumatoid arthritis, 56(1):46–52
Rhodes R: see Moros DA
Rights approach and the intimacy approach, the: family suffering and defective newborns, Blustein J, 56(3):164–167
Right to health care, aged, 56(3):168–175; and drug dependency, 56(3):176–179; general, 56(3):161–163
Rivkind A: see Katz G
Roige M: see de la Sierra A
Role of sympathetic innervation and sympathomimetics in gastric secretion in vivo, the, Magee DF, 56(4):272–278
Rorat E: see Klapholz A
Rosenberg G, Dana B, eds, Social implications of health care in contemporary perspectives: essays in honor of Helen Rehr, 56(6):427–494; foreword, 56(6):427–428
Rosenberg MM, photograph, 56(5):359
Rowe JW: Inaugural address, 56(5):423–426
Rowe JW, photograph, 56(5):363
Rubin H: see Yagil Y
Rubinstein AB: see Reichenthal E
Ruddick W: Why not a general right to health care? 56(3):161–163

Sachdev V: see Lusins J
Sacks H: see Strain J
Sakurai H: see Jagirdar J
Salky BA: see Keller RJ
Salsitz E: see Klapholz A
Santos MJ: see de la Sierra A
Sarcoidosis complicating primary Sjogren's syndrome, Justiniani F, 56(1):59–61
Savoretti P: see Lehrer S
Schaffner F: see Bach N
Schanzer H: see Peirce EC II
Schorr-Lesnick B: Lung function and health attitudes and habits in professional wind musicians and vocalists, 55(4):346–352; see Journal, Mount Sinai, Student Prize
Schultz BL: see Bach N
Schwartz N, Eisenkraft J: Malignant hyperthermia in a child with sleep apnea, 56(2):123–125
Schwartz IS, ed, Surgical Pathology Notes, 56(2):147–149
Sedlin ED: see Sturm PF
Seife B: see Weinberg B
Seldin D, photograph, 56(5):359
Shah KD: see Weinberg B
Shenk C: see Torino F
Simmons WJ, Bixby NB: A model for leadership in administrative practice, 56(6):429–434
Sirota D: Axillary vein thrombosis as the initial symptom in metastatic papillary carcinoma of the thyroid, 56(2):111–113
Sjogren's syndrome, diagnosis, 56(1):59–61
Skarzynski J: see Lee HK
Social implications of health care in contemporary perspectives: essays in honor of Helen Rehr, Rosenberg G, Dana B, eds, 56(6):427–494
Social well-being: the future of the social and health care systems, Kaplan KO, 56(6):483–489
Social risk indicators for poor adjustment to nursing home placement, Mulvihill M, Reshen AB, Hsu MA, 56(6):478–482
Social work: an important component of community medicine at the Mount Sinai School of Medicine, Bosch SJ, Deuschle KW, 56(6):459–467
Sohval A, photograph, 56(5):346
Song H: see Lehrer S
Sonographic findings in necrotizing enterocolitis with paucity of abdominal gas, Weinberg B, Peralta VE, Diakoumakis EE, Shah KD, Mollin J, Jhaveri MK, Seife B 56(4):330–333
Sonography in early pregnancy: the significance of subchorionic hemorrhage, Bloch C, Altchek A, Levy-Ravetch M, 56(4):290–292
Splenectomy, 56(2):97–98
Squire A: see Bach N
Stamler J, Horowitz SF, Goldman ME, Matza D, Machac J: Peripartum cardiomyopathy: a role for cardiac stress determinants other than pregnancy? 56(4):285–289
Steinbach M, photograph, 56(5):359
Stimmel B: Educational process at the Mount Sinai School of Medicine: the first 25 years, 56(5):375–382; Unlimited entitlement to health care: the dilemma of narcotic dependency, 56(3):176–179
Strain J, Fahs M, Fulop G, Sacks H: AIDS: epidemiology and treatment issues, 56(3):233–237
Strauchen J: see Bleiweiss I
Student Corner: Cuzzo-Kriner MR: Intestinal endometriosis and its complications: case report and review, 56(4):334–337; Mendez IB, Leddomado E: Orthotopic liver transplantation in children, 56(1):71–76; Wagner R: Aortic

graft–enteric fistula and paraprosthetic–enteric fistula: a review, 56(2):150–156; Zuckerman S: New directions in the management of Zollinger-Ellison syndrome, 56(4):338–342
Sturm PF, Levine J, Sedlin ED, Ulin RI: Isolated dislocation of the radial head: three cases and review, 56(4):304–308
Subietas A: see Waxman J
Surgery, proctectomy, 56(1):36–40; residency training, 56(5):367–369
Surgical alternatives for the treatment of nonparasitic liver cysts, Boyle T, Kim U, 56(2):90–92
Surgical choices, club feet, 56(1):17–22
Surgical management, hepatic cysts, 56(2):90–92
Surgical occlusion in pancreatitis, 56(2):79–82
Surgical Pathology Notes, Ira S. Schwartz, ed: Jagirdar J, Frydman C, Sakurai H, Dumitrescu O: Mesothelial papillary proliferation of the pleura associated with radiation therapy: does it have a role in the pathogenesis of mesothelioma? 56(2):147–149
Suster S, Porges R, Tobias J, Nanes M: Giant-cell neoplasm of the sphenoid sinus, 56(2):118–122
Swazey J: Gift of life: dilemmas in organ transplantation, 56(5):395–405
Synthetic media for in vitro fertilization, 56(2):141–146
Systemic lupus erythematosus of the central nervous system: 2. Molecular theories and models for mental disease, Moskowitz N, 56(1):23–29

Talavera W: see Klapholz A
Tallon J: Legislative issues in delivering health care, 56(3):191–193
Teirstein A: Residency training programs then and now: medicine, 56(5):370–374
Thalassemia major, 56(2):97–98
Thrombosis in thyroid carcinoma, 56(2):111–113
Thung SN: see Bach N
Tobias J: see Suster S
Torino F, Gil O, Garaycoechea M, Garcia H, Casavilla A, Shenk C, Hojman D: Pancreatic duct occlusion in the management of acute necrotizing pancreatitis in a canine model, 56(2):79–82
Transplantation, criteria, 56(3):197–201; criteria, policies, 56(3):207–220; dilemmas in, 56(5):395–405; liver, in children, 56(1):71–76; organ procurement and allocation, 56(3):202–206
Tuberculous abscess of the pancreas in AIDS: CT findings, Berson BD, Mendelson DS, Janus CL, 56(4):297–299
Tzardis P: see Golematis B

Ulin RI: see Sturm PF
Unger AC, photograph, 56(5):394
Unlimited entitlement to health care: the dilemma of narcotic dependency, Stimmel B, 56(3):176–179
Urbano-Marquez A: see de la Sierra A

Value of hepatic blood flow study in the diagnosis of hepatoma, Lee HK, Skarzynski J, Kim U, 56(1):33–35
Veatch R: Quest for quality health care: whose choice? whose responsibility? 56(5):406–422
Vuletin J: see Waxman J

Wagner R: Aortic graft-enteric fistula and paraprosthetic-enteric fistula: a review, 56(2):150–156; see Bleiweiss I
Wallace DJ, Brachman M, Feldman G, Reichman R, Klinenberg JR, Quantitative computerized joint scanning in rheumatoid arthritis: an accurate reproducible method of quantitating synovitis—preliminary report, 56(1):46–52
Waxman J, Kim U, Subietas A, Vuletin J, Waxman M: Diffuse neurofibroma of the pylorus: a cause of gastric outlet obstruction, 56(2):129–132
Weinberg B, Peralta VE, Diakoumakis EE, Shah KD, Mollin J, Jhaveri MK, Seife B: Sonographic findings in necrotizing enterocolitis with paucity of abdominal gas, 56(4):330–333
Weinberg RA: Impact of molecular biology on understanding of the human disease process, 56(5):392–394
Weinrauch H: see Yagil Y
Weizman H, Kahn T: Maintenance of metabolic alkalosis despite saline administration in the presence of ascites, 56(2):126–128
Why not a general right to health care? Ruddick W, 56(3):161–163
Widrow C: see Klapholz A
Winters SL: see Donofrio MT
Wolf B, photograph, 56(5):373
Wood DL, Morgenstern L: Liposarcoma of the ileocecal valve: a case report, 56(1):62–64

Yagil Y, Futterweit W, Krakoff LR, Rubin H, Weinrauch H: Cerebellar tumor causing hypertensive crisis and stimulating pheochromocytoma and Cushing's syndrome, 56(1):56–58
Yu T, Oreskes I: Lipid studies in primary gout, 56(1):11–16

Zinberg J: Duty to treat AIDS patients: a physician-lawyer's perspective, 56(3):259–264
Zinn KM, ed, Ophthalmology Notes, 56(4):326–329
Zollinger-Ellison syndrome, management, 56(4):338–342
Zuckerman S: New directions in the management of Zollinger-Ellison syndrome, 56(4):338–342

THE MOUNT SINAI JOURNAL OF MEDICINE
Vol. 56, No. 6, November 1989
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